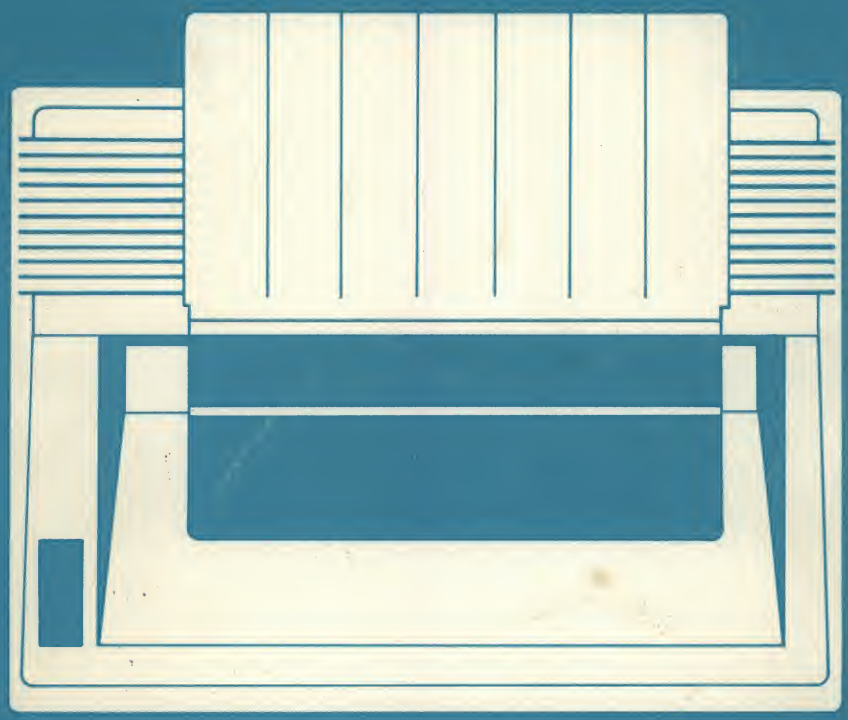
SP SP-180AI
MATRIX PRINTER

OWNER'S MANUAL



WARNING:
"This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only computers certified to comply with the Class B limits may be attached to this printer. Operation with noncertified computers is likely to result in interference to radio and TV reception."

"This equipment generates and uses radio frequency and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/ television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems",

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.'

"It is necessary to use shielded interconnect cables to insure compliance with FCC Class B limits for radio frequency emissions".

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20-1-2003
Emulations: EPSON FX-80
IBM 5152 Graphics Printer
20-2-2003
Ribbon : SP-16051

CONTENTS

MAIN FEATURES 1
CAUTIONS FOR USE 1
SPECIFICATIONS 2
Printing Specifications 2
Other Specifications 4
SETTING UP THE PRINTER 5
Unpacking the Printer 5
Operator Controls 6
Installing the Ribbon Cassette 8
Using Continuous Forms 9
Loading Single Sheet Paper 11
Installing the Tractor Unit 13
Tof of Page Setting 14
ADJUSTING THE HEAD ADJUSTMENT LEVER 15
CONNECTING THE PRINTER TO A COMPUTER 16
INTRDUCTION TO PRINTER FEATURES FOR BEGINNERS 18
STEP 1. Character Width Selection 18
STEP 2. Double-Width Character 21
STEP 3. Superscript and Subscript 23
STEP 4. Underlining 24
STEP 5. Empahsized Printing 25
STEP 6. Double-Strike Printing 26
STEP 7. Page Length Setting 27
STEP 8. Horizontal Tab Setting 29
STEP 9. Margin Setting 31
STEP 10. Graphic Printing 33
DIP SWITCHES 36
RUNNING THE SELF TEST 39
AUTOMATIC PRINTING FUNCTION 39
ERROR WARNINGS 39
PRINT MODE FLOWCHART 40
PRINT MODE SPECIFICATIONS 41
CONTROL CODES 43
• Print Commands 43

- Double-strike Character 58
- Double-width Character 59
- Graphic Mode 60
- Linefeed Pitch 68
- Page Length 73
- Horizontal Tab 75
- Margin Setting 76
- Underlining 79
- Buffer Clear 79
- Back Space 80
- Home Positioning 80
- Skip-over Perforation 81
- Reset 82
- Printing Direction 83
- International Characters 84
- Tab Initialization 86
- Deleting Data 86
- Vertical Tab 86
- Printer Selection 89
- Download Character (User-defined character) 89
- Input Data Control 97
- Print Code Area Designation 99
- Immediate Printing 103
- CR Code Control 104
- Print Position Control 105

TROUBLESHOOTING 107

APPENDIX A GLOSSARY 108

APPENDIX B DEFAULT SETTINGS 116

APPENDIX C CHARACTER CATEGORY PRIORITY TABLE 117

APPENDIX D PARALLEL INTERFACE 122

APPENDIX E CHARACTER SET TABLE 127

APPENDIX F CONTROL CODE SUMMARY 130

MAIN FEATURES

Congratulations for selecting this dot-matrix printer!
This printer provides the following features:

1. A variety of character fonts are possible including Near Letter Quality (N.L.Q.) and Graphic printing
2. Self Test printing
3. Automatic printing
4. Double-Width character mode
5. Double-Strike character mode
6. Download character function (User-defined character)
   A maximum of 128 download characters in Draft mode
7. Italic Cursive character mode
8. Internal RAM error detection
9. Left and right margin settings
10. Emphasized character mode
11. Standard mode/IBM mode, selected by using a DIP switch
12. 1.5K-byte communication buffer

CAUTIONS FOR USE

- Do not use a power supply voltage that is other than the specified one.
- Wait at least two seconds after turning power off before turning it back on again. The initialization process may not be performed correctly if this is not done.
- The printer should be used when the humidity is low, when there is little dust, and where the printer is not in direct sunlight.
- Do not perform printing without the ribbon cassette and paper properly installed.
- Never install the tractor unit when using friction feed for cut sheet paper.
- Do not touch the print head immediately after printing because it is hot.
- When using continuous forms, refrain from turning the paper feed knob counter-

SPECIFICATIONS

Printing Specifications

1. Printing Method
   Impact Dot Matrix
   Bidirectional Logic Seeking Printing

2. Print Head
   9 Pins

3. Number of Characters
   185 Characters and Symbols
   49 International Characters

4. Graphic Printing
   8 Categories, vertical 8 dots

   - 480 dots graphic: Note 1
   - 576 dots graphic
   - 640 dots graphic
   - 720 dots graphic
   - 960 dots graphic: Note 1
   - 960 dots graphic: Note 2
   - 1920 dots graphic: Note 2
   - 1152 dots graphic

   Note 1: Vertical 9 dots printing is also possible.
   Note 2: When the leading dot is printed, the following horizontal dot cannot be printed.

5. Print Mode

   Draft Mode:

Pica	10 CPI
Elite	12 CPI
Condensed	17 CPI

   Near Letter Quality:

Pica	10 CPI
Elite	12 CPI

   8 categories of graphic printing

Mixing any of the above modes within a single line is possible.
In addition, this printer is capable of Bold, Double-Width, Double-Strike, Superscript/Subscript, Proportional, and Italic Character modes.

6. Paper Feed Method, Paper Width, and Paper Weight

Friction method:	Cut sheet (A4, B5, letter, legal) 14 lbs. – 21 lbs. in USA 53 g/m^2 – 81 g/m^2 in Europe
Tractor method:	Fan-fold paper (4″ – 10″) 14 lbs. – 21 lbs. in USA 53 g/m^2 – 81 g/m^2 in Europe

7. Multiple Copies
   Original plus 2, non-carbon, 40 g/m^2
   Total thickness of less than 0.2mm

8. Throughput
   54 lines/minute in Draft Pica mode

9. Line Feed Pitch
   Minimum of 1/216″

10. Line Feed Speed
    6.7 lines /second

11. Print Speed
    Draft Pica: 100 cps
    NLQ Pica: 16 cps

Other Specifications

1. Power Supply	120 VAC: For USA and Canada 220-240 VAC: For Europe
2. Temperature	41°F – 95°F (during operation) [5°C – 35°C]
3. Humidity	20% – 80% (during operation)
4. External Dimensions	16.0″(Width) × 4.61″(Height) × 10.8″(Depth) [407(W) × 117(H) × 274(D) mm] (The depth is 11.8″ [300mm] when the Paper separator is attached)
5. Weight	Approximately 9.3lbs [4.2kg]
6. Power Consumption	20 watts (Self test in Draft mode) 9 watts (Stand-by)

SETTING UP THE PRINTER

Unpacking the Printer

Be sure to locate the following components that come with the printer in the box.

1. Printer
2. Ribbon Cassette
3. Tractor Unit (installed on printer)
4. Paper Separator
5. Owner's Manual

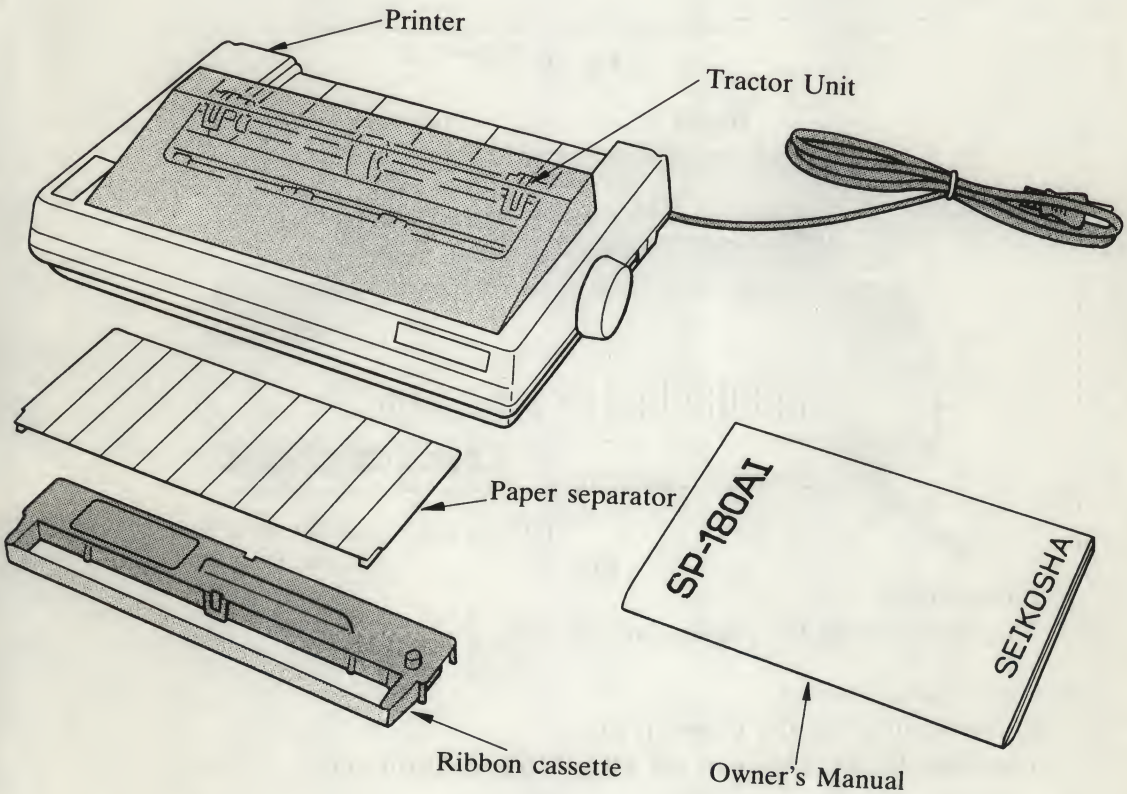


Fig. 1.

Operator Controls

It is important to become familiar with the printer before setting it up and using it.

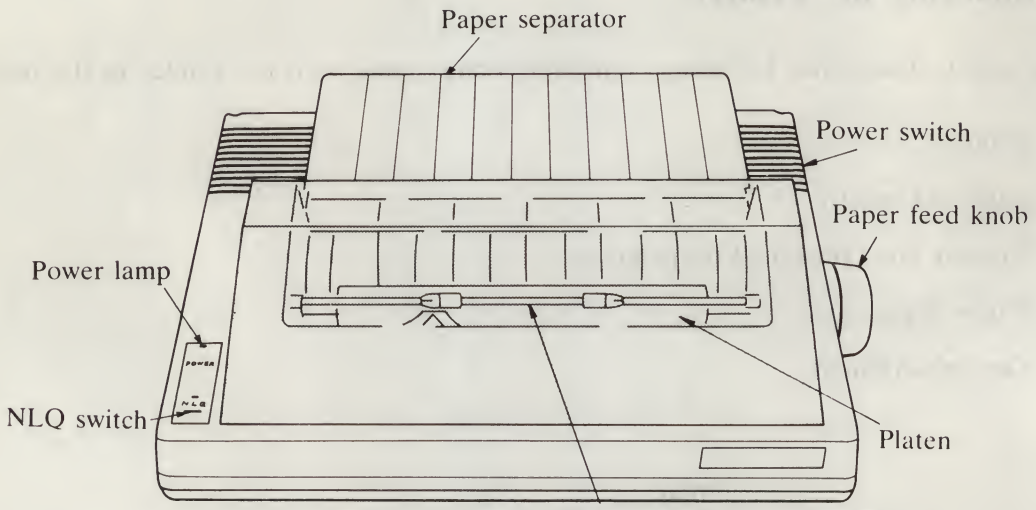


Fig. 2

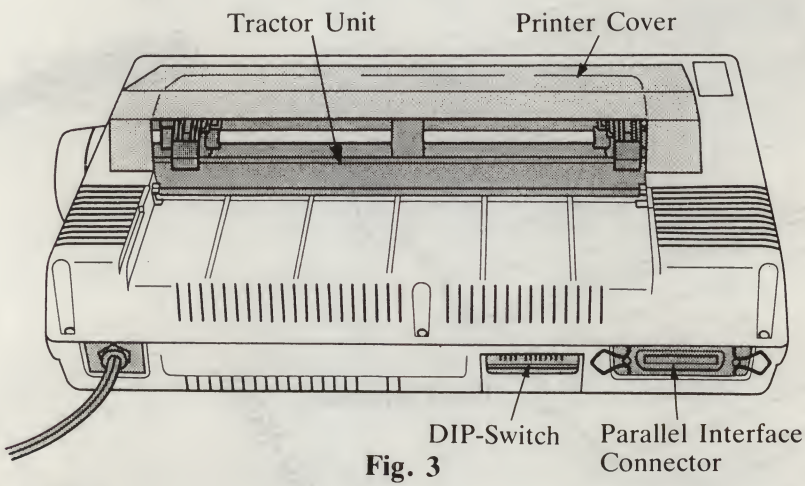


Fig. 3

1. Power switch
   This switch turns the printer on and off.

2. Power lamp (green)
   Remains on while the power is on.
   The lamp blinks, either in the OFF-LINE or error state.

3. Front panel switch
   If this switch is pressed in the ON-LINE state, the printer enters the OFF-LINE state. (The power lamp blinks while in the OFF-LINE state.)

If this switch is pressed for more than 2 seconds in the OFF-LINE state, the print character mode changes (DRAFT ⟷ NLQ).
When the NLQ mode is selected, the NLQ lamp is on.
When the Draft mode is selected, the NLQ lamp is off.

If this switch is pressed less than 2 seconds in the OFF-LINE state, the printer enters the ON-LINE state.

4. NLQ lamp (green)
   The lmap is on in the NLQ mode and is off in the Draft mode.

Installing the Ribbon Cassette

1. Unpack the ribbon cassette and turn the ribbon feed knob in the direction of the arrow to remove the slack in the ribbon.

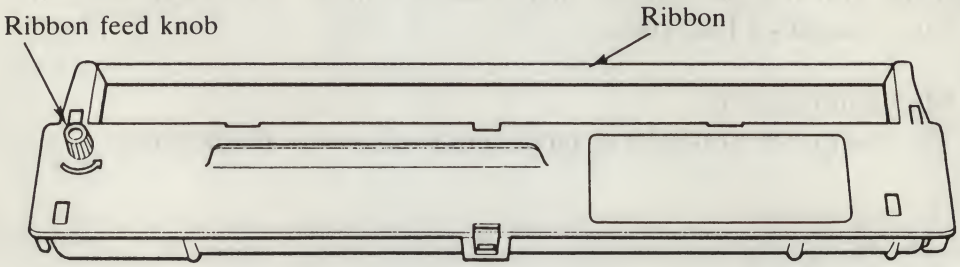


Fig. 4

2. Be sure the power is switched off, and manually move the print head to the extreme left.

Note: It is easier to insert the ribbon when the print head is at the home position (extreme left).

3. Insert the ribbon between the ribbon mask and the print head, and position the cassette so that the ribbon feed shaft in the printer is inserted into the hole under the ribbon feed knob.

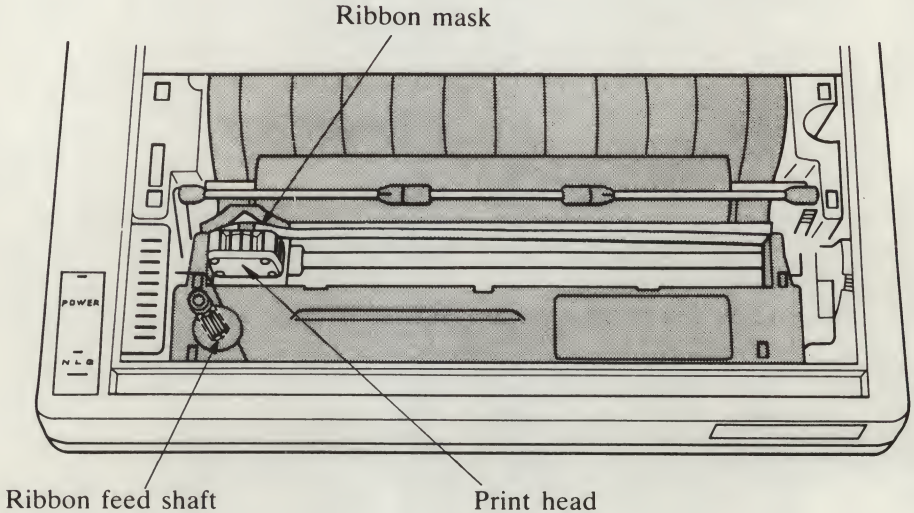
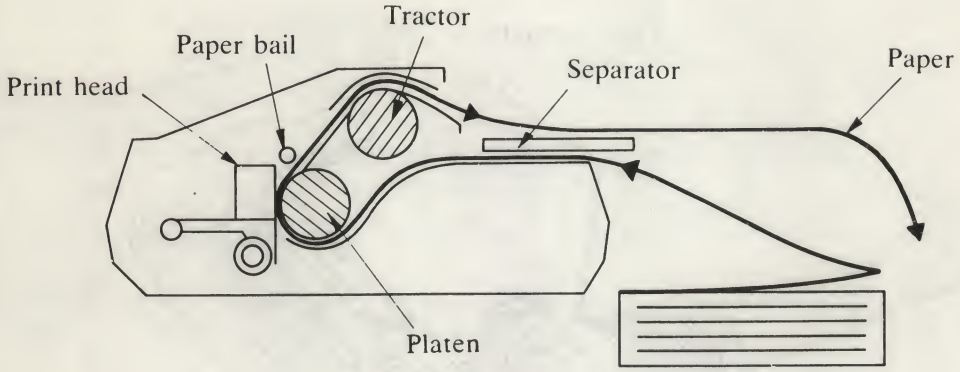


Fig. 5

Using Continuous Forms



Paper feed path
Fig. 6

1. Remove the printer cover and the paper separator. Pull the paper bail toward the front.
2. Manually feed the paper into the printer from the back until the paper appears between the platen and the print head.

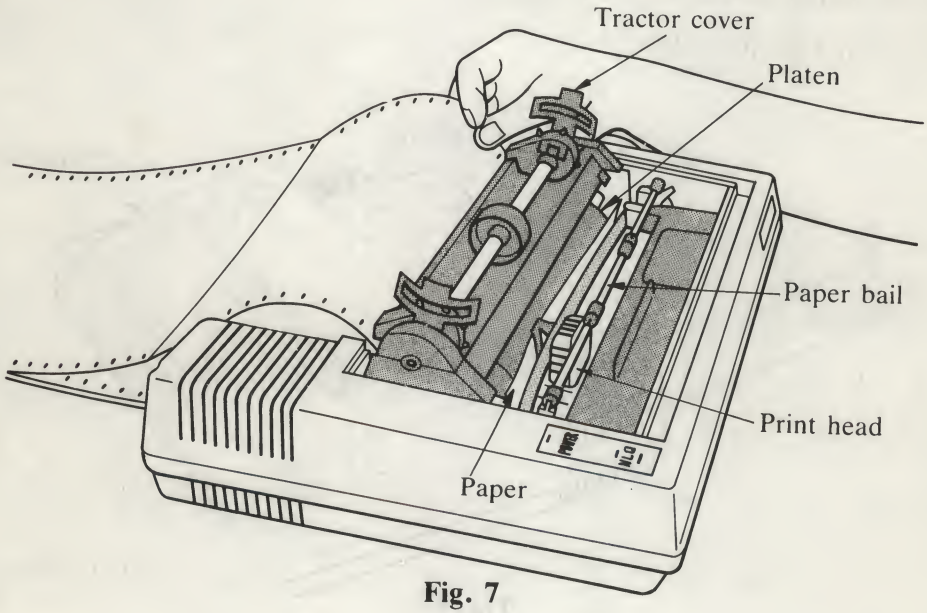


Fig. 7

3. Open the tractor covers on the left and right.
   Adjust the tractors so that the distance between them matches the holes in

5. Push the paper bail toward the platen.
6. Hold the paper separator upright and place it on the two supports located behind the tractor.

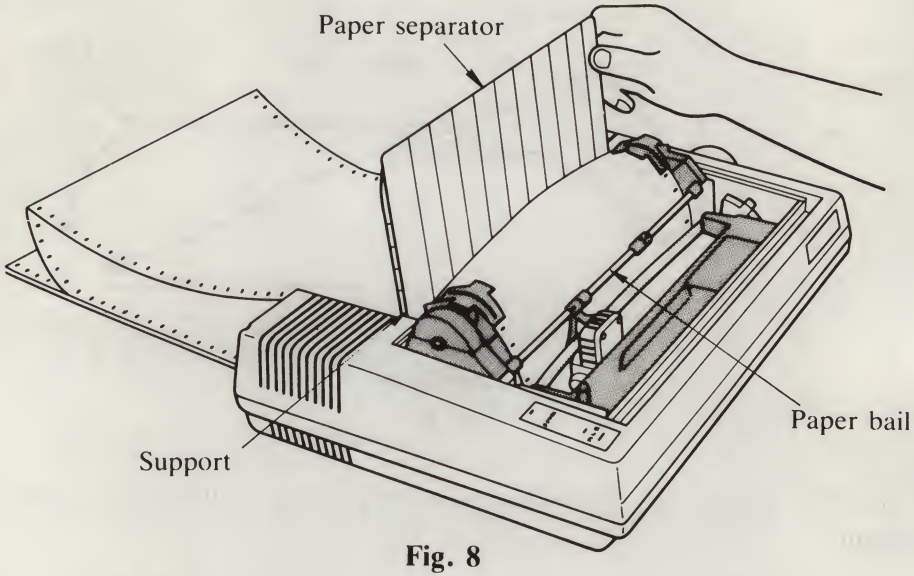


Fig. 8

7. Lay the paper separator down flat.
8. Replace the printer cover.

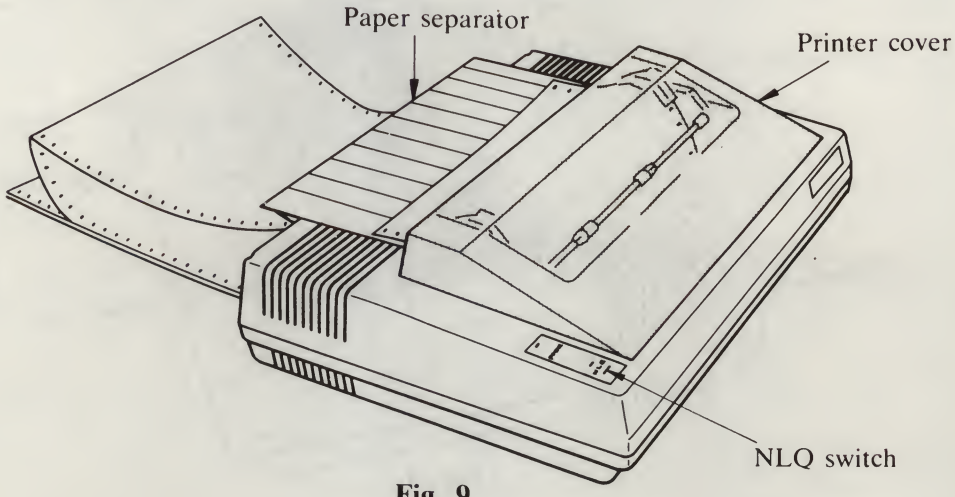


Fig. 9

9. Perform self test printing to make sure the printer is working properly.
   To initiate self test printing, hold down the NLQ switch while turning the power

Loading Single Sheet Paper

Remove the tractor unit when using friction feed for the single sheet paper.

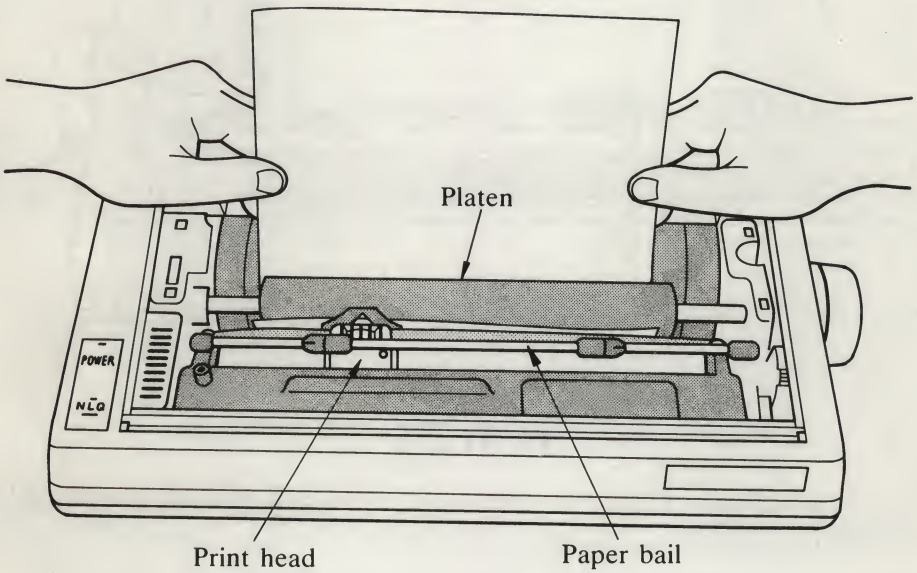


Fig. 10

1. Move the paper bail toward the front.
2. Insert the single sheet into the printer from the back by hand until it appears between the print head and the platen.
3. Turn the paper feed knob to feed the single sheet so that both paper ends of the single sheet are aligned.

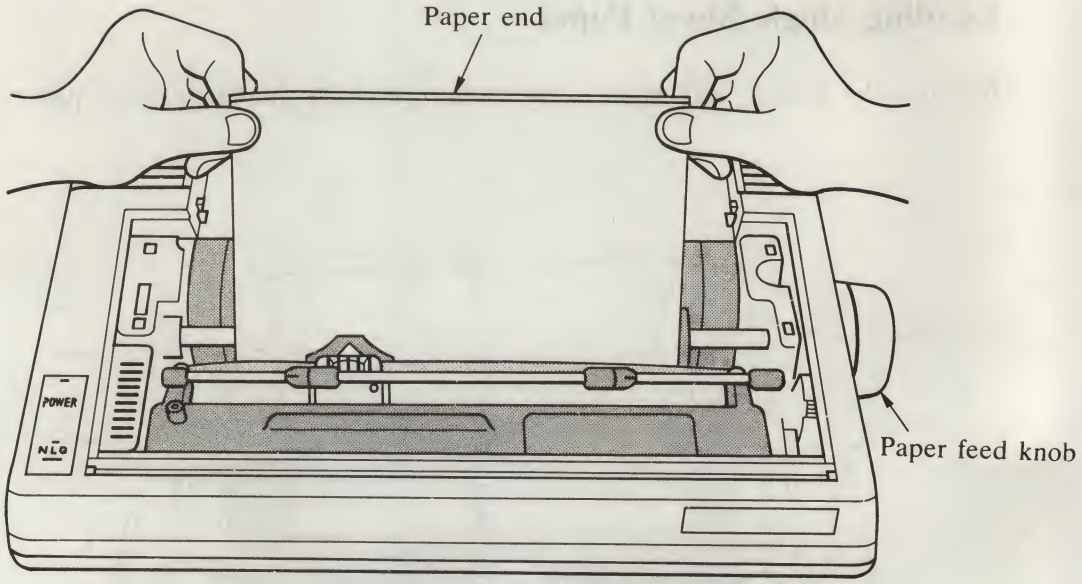


Fig. 11

4. Rectify the single sheet so that the upper and lower ends would meet exactly if placed together.
5. Move the paper bail toward the platen to press against the single sheet.
6. Turn the paper feed knob counterclockwise to set the single sheet to the TOF (top of form) position.

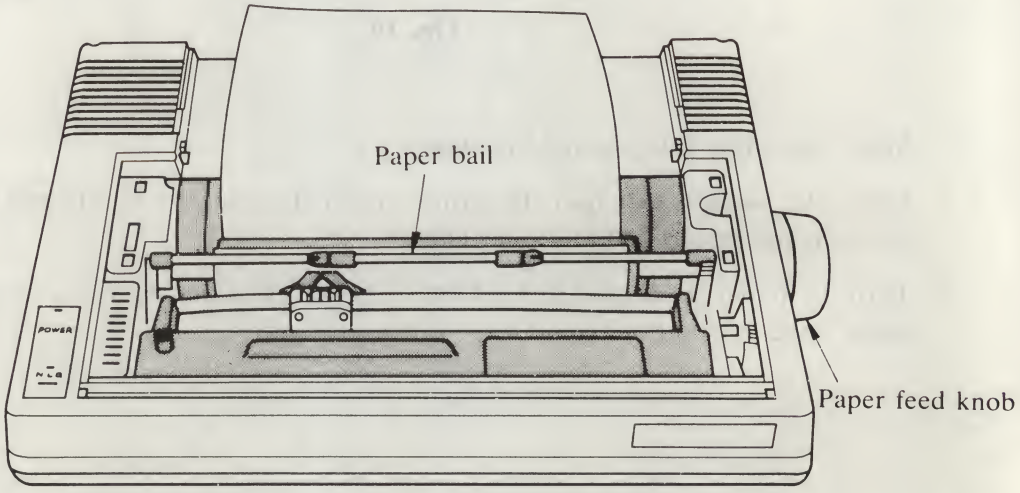


Fig. 12

Installing the Tractor Unit

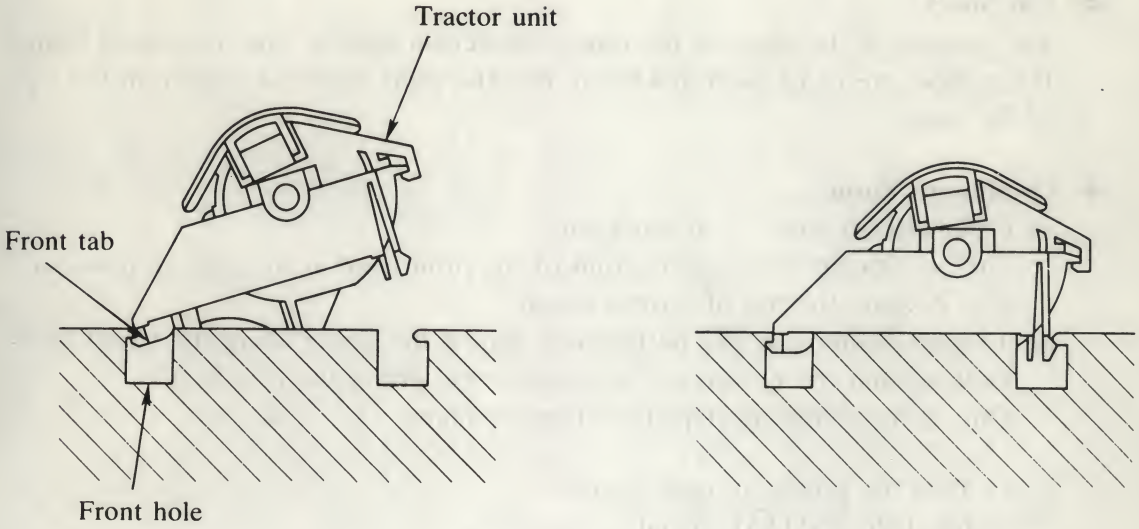


Fig. 13

1. Move the paper bail toward the front.
2. Insert the front tabs of the tractor into the holes on both sides of the platen.
3. Push down on both ends at the rear of the tractor until it is firmly secured.

Top of Page Setting

- **Cut Sheet**

  The position of the paper at the time of power-on is to become the top of form. If cut sheet are to be used make sure that the print head is 1 inch from the top of the sheet.

- **Continuous Form**

  i) Paper already inserted at power-on.
  The position of the paper in front of the print head at the time of power-on is to become the top of form position.

  ii) To start printing at the perforation, adjust the paper using the paper feed knob so that the perforation is located right above the printhead.
  One of the following steps is to then be taken.

  1) Turn the power on once again.
  2) Input the $\overline{\text{INITIAL}}$ signal.
  3) Perform an ESC @ command.
  4) Perform an ESC C command.

ADJUSTING THE HEAD ADJUSTMENT LEVER.

The blue head adjustment lever on the right side of the print head lets you adjust the gap between the paper and the print head.

The printer is shipped with this lever set to the third position, which is suitable for standard one-part paper.

To print on multi-part paper, pull this lever away from the platen to increase the gap between them.

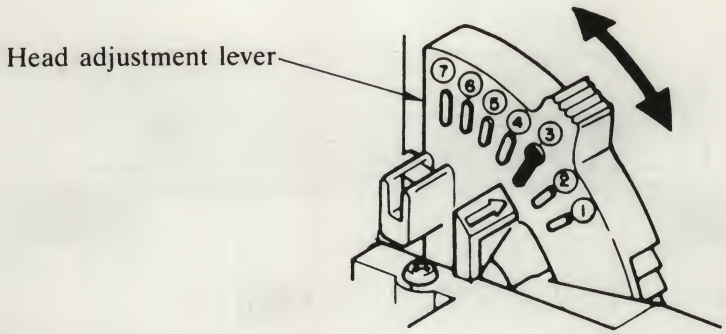
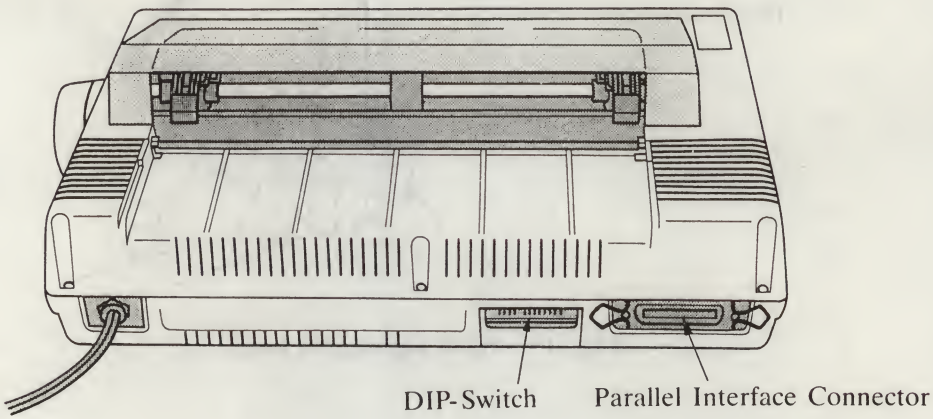


Fig. 15 Head adjustment lever

CONNECTING THE PRINTER TO A COMPUTER

You should have a parallel interface cable to connect a computer to the printer. Before connecting them, make sure that they are both turned OFF.
If you are uncertain about what type of interface cable to use, consult the dealer where you purchased the printer.
However, if you make your own interface cable, please refer to the "PARALLEL INTERFACE" chapter on page 122.



1. Insert the 36-pin plug into the parallel interface connector on the right back of the printer.
2. Snap the 2 wire clips onto the plug to make a secure connection.
3. Connect the other end of the cable to a computer.
4. Insert the ribbon cassette and the paper into the printer.
5. First turn on the printer's power, then the computer's power.
6. Try the following simple IBM BASIC program to output data to the printer. If necessary, change it to suit your computer's language.

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,"Program example for the IBM PC.";CHR$(10);
40 PRINT #1,"The connection is O.K.";CHR$(10);
50 END
```

RUN ENTER

7. The printout should look like this:

```
Program example for the IBM PC.
The connection is O.K.
```

This printout shows that the connection is correct.
Refer to the IBM BASIC reference documentation for further details on PRINT statements.

INTRODUCTION TO PRINTER FEATURES FOR BEGINNERS

You can skip this chapter and go straight to the next chapter if you are familiar with printer control programming.

If you are not familiar with features of the printer and/or BASIC programming, read this chapter carefully to learn how to get the most out of the printer.

It is actually worth running the sample programs listed in this chapter.

The examples in this chapter are written in the IBM BASIC programming language for the parallel interface. Change them, if necessary, to suit your computer's language.

STEP 1. Character Width Selection

Printing example of each character width:

Draft Pica	ABCDEFGHIJKLMNOPQRST	10 characters/inch
Draft Elite	ABCDEFGHIJKLMNOPQRSTUVWX	12 characters/inch
Condensed	ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefgh	17 characters/inch

To start Advanced BASIC on the IBM-PC:

1. Insert the PC DOS diskette in drive A.
2. Switch on the IBM-PC.
3. Enter the command "BASICA".

Now you can type the program below to print characters of the 3 different widths.

Program Example:

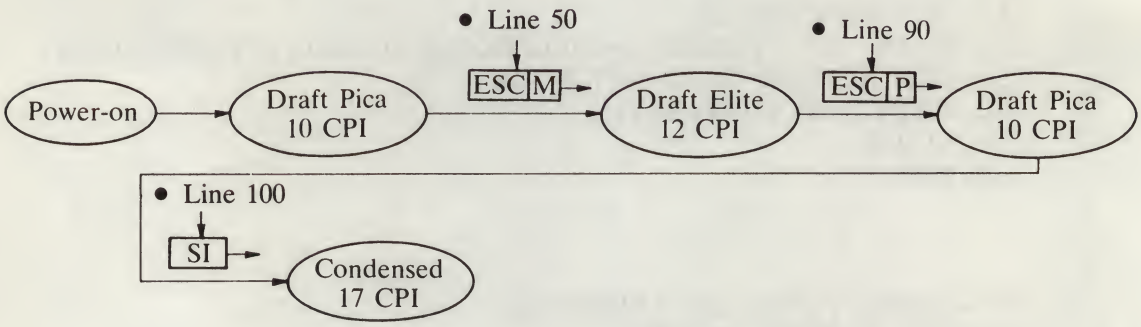
```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 REM DRAFT PICA
40 PRINT #1,"ABCDEFGHIJKLMNOPQRSTUVWXYZ";CHR$(10);
50 PRINT #1,CHR$(27);"M";
60 REM DRAFT ELITE
70 PRINT #1,"ABCDEFGHIJKLMNOPQRSTUVWXYZ";CHR$(10);
80 REM RETURN TO DRAFT PICA
90 PRINT #1,CHR$(27);"P";
100 PRINT #1,CHR$(15);
110 REM CONDENSED
120 PRINT #1,"ABCDEFGHIJKLMNOPQRSTUVWXYZ";CHR$(10);
130 REM RETURN TO DRAFT PICA
140 PRINT #1,CHR$(18);
150 CLOSE
160 END
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
```

Lines 10 and 20 allow all 256 ASCII characters to be transmitted to the printer without change. In line 20, a width of 255 suppresses the automatic line feed after a carriage return (CHR$(13)).

Line 40 outputs characters A through Z to the printer. They are printed in Draft Pica since this is the printer's default mode at power-on.

Line 50 changes Pica to Elite pitch before printing the characters output by line 70.

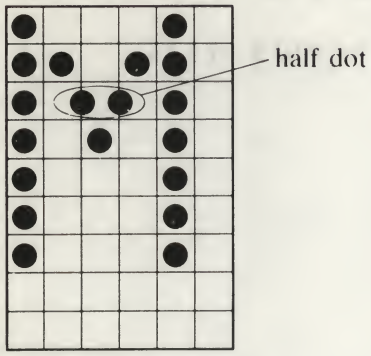


ESC is a symbol of code 27 in decimal, or code 1B in hexadecimal, represented by CHR$(27) in Basic language.
SI is represented by CHR$(15).

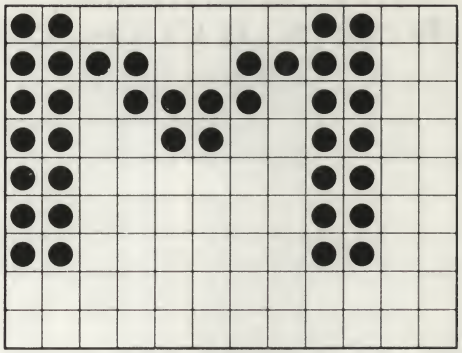
Run the program to see the different width characters.

STEP 2. Double-Width Character

Dot matrix representations of normal width and double-width characters:



Normal width



Double-Width

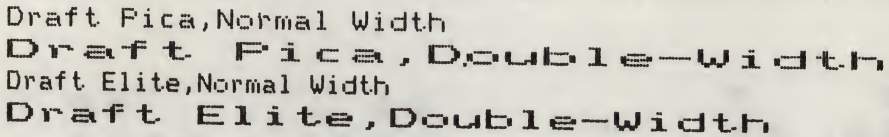
The 2 middle dots crossing the vertical lines of the normal width matrix are called 'half dots'.
A half dot cannot be printed if the horizontal leading dot is printed.
Switch the printer off and back on again to reset the printer before typing the following sample program:

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,"Draft Pica,Normal Width";CHR$(10);
40 REM Double-Width
50 PRINT #1,CHR$(14);
60 PRINT #1,"Draft Pica,Double-Width";CHR$(10);
70 REM Elite
80 PRINT #1,CHR$(27);"M";
90 PRINT #1,"Draft Elite,Normal Width";CHR$(10);
100 REM Double-Width
110 PRINT #1,CHR$(14);
120 PRINT #1,"Draft Elite,Double-Width"
130 CLOSE
140 END
```

Line 50 designates Double-width mode, but it is valid only for the current line. That's why line 110 should be output to designate Double-width mode again.
Another command to designate Double-width mode is:

```
PRINT #1,CHR$(27);"W1";
```

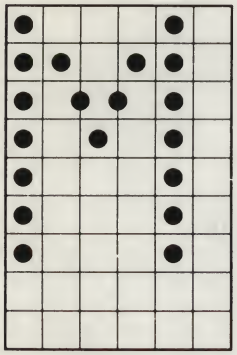
Run the program to print:



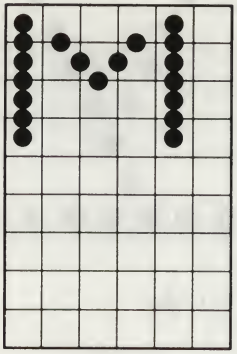
STEP 3. Superscripts and Subscripts

Superscripts and Subscripts are printed in half-character height.

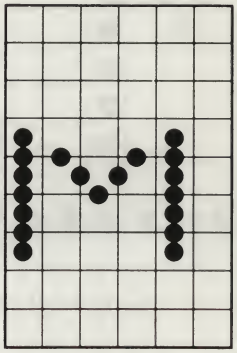
Dot matrix representations of normal height, Superscript, and Subscript characters:



Normal height



Superscript



Subscript

Program Example:

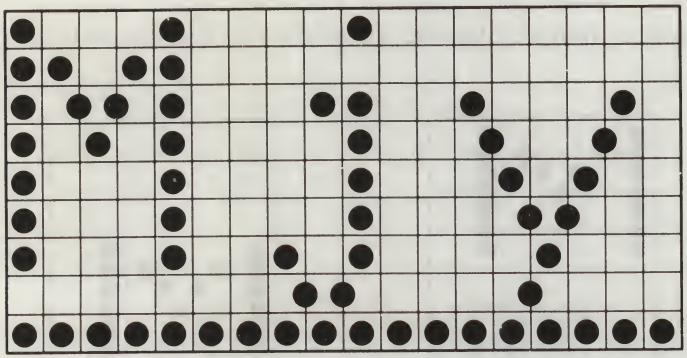
```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,"Draft Pica,Normal Height ";
40 REM SUPERSCRIPT DESIGNATION
50 PRINT #1,CHR$(27);"S0";
60 PRINT #1,"Superscript";CHR$(10);
70 REM SUPERSCRIPT TERMINATION
80 PRINT #1,CHR$(27);"T";
90 PRINT #1,"Normal Height again ";
100 REM SUBSCRIPT DESIGNATION
110 PRINT #1,CHR$(27);"S1";
120 PRINT #1,"Subscript";CHR$(10);
130 REM SUBSCRIPT TERMINATION
140 PRINT #1,CHR$(27);"T";
150 CLOSE
160 END
```

Line 80 shows that the [ESC][T] command is output to return to normal character height.
If the above program is run the following is printed:

```
Draft Pica,Normal Height Superscript
```

STEP 4. Underlining

Dot matrix representation of underlined characters:



The underline is created by the 9th dot.

Program Example:

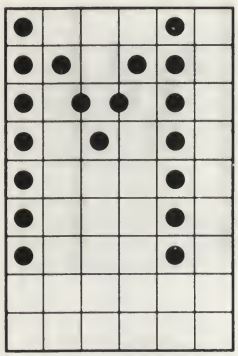
```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,"Lisa is ";
40 REM UNDERLINE DESIGNATION
50 PRINT #1,CHR$(27);"-1";
60 PRINT #1,"a beautiful girl";
70 REM UNDERLINE TERMINATION
80 PRINT #1,CHR$(27);"-0";
90 PRINT #1," indeed.";CHR$(10)
100 CLOSE
110 END
```

Line 50 outputs the [ESC][-][1] command to start underlining and line 80 uses the [ESC][-][0] command to stop underlining.
If the above program is run, the following is printed:

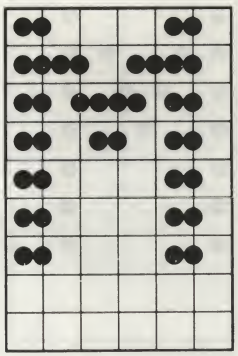
Lisa is a beautiful girl indeed.

STEP 5. Emphasized Printing

Dot matrix representation of emphasized character.



Normal



Emphasized

Emphasized printing causes each dot of a character to be doubled horizontally, creating a bold image as shown above.

Program Example:

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 REM EMPHASIZED DESIGNATION
40 PRINT #1,CHR$(27);"E";
50 PRINT #1,"Emphasized printing";CHR$(10);
60 REM EMPHASIZED TERMINATION
70 PRINT #1,CHR$(27);"F";
80 PRINT #1,"Back to Normal";CHR$(10);
90 CLOSE
100 END
```

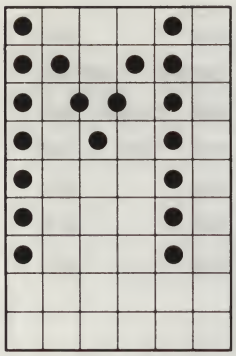
Line 40 outputs the [ESC][E] command to set Emphasized printing mode.
Line 70 outputs the [ESC][F] command to return to Normal printing mode.

Print Sample:

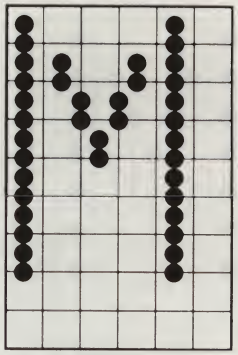
```
Emphasized printing
Back to Normal
```

STEP 6. Double-Strike Printing

Dot matrix representation of double-strike character.



Normal



Double-strike

In Double-strike printing mode, each dot comprising a character is printed twice vertically, creating an enhanced image. This printing requires 2 passes of the print head with a 1/144″ paper feed between passes.

Program Example:

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,CHR$(27);"G";'Double-strike designation
40 PRINT #1,"Double-strike printing";CHR$(13);CHR$(10);
50 PRINT #1,CHR$(27);"H";'Double-strike termination
60 PRINT #1,"Back to Normal"
70 END
```

Line 40 shows that the ESC G command is used to designate Double-strike printing mode.

Print Sample:

```
Double-strike printing
Back to Normal
```

STEP 7. Page Length Setting

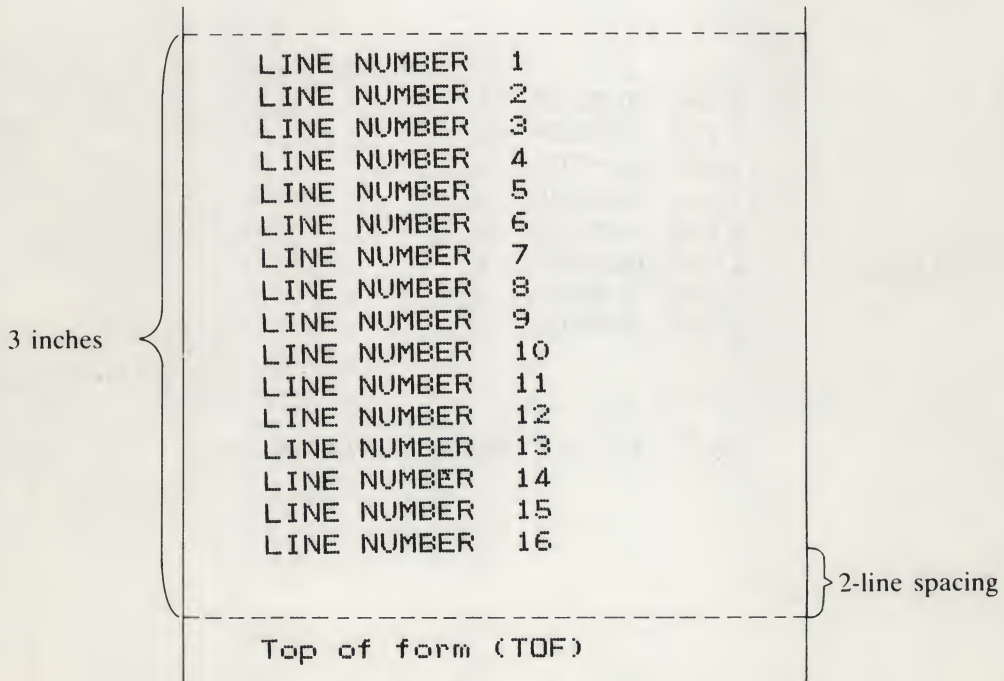
The page length can be selected in either inch or line increments through software control.

7-1. Page length setting in inches.

Let's see how many lines can be printed if the page length is set to 3 inches.

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 REM SET PAGE LENGTH TO 3 INCHES
40 PRINT #1,CHR$(27);"C";CHR$(0);CHR$(3);
50 FOR I=1 TO 16
60 PRINT #1,"LINE NUMBER ";I;CHR$(10);
70 NEXT I
80 REM FEED PAPER TO NEXT TOF
90 PRINT #1,CHR$(12);
100 PRINT #1,"Top of form (TOF)"
110 CLOSE
120 END
```

Now run the program.



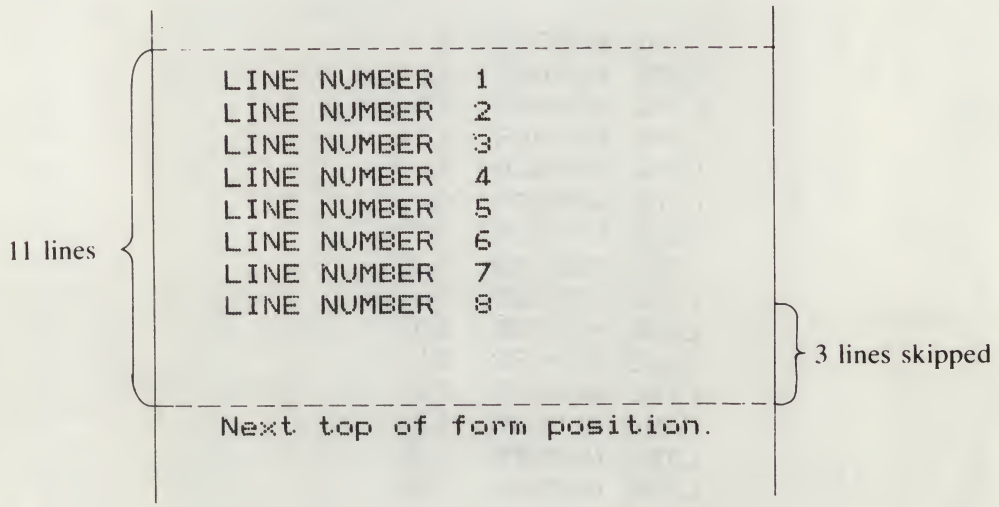
2 lines are skipped by the input of the FF code in line 90. Thus, a total of 18 lines can be printed per page when the page length is set to 3 inches.
If you divide 3 inches by 18 lines, the result is 1/6 inch-per-line, which is equal to the one line default setting at power-on.

7-2. Page length setting in lines

The page length can also be set in line units. The actual length of a page depends on the line spacing at the time that the printer receives the command.

Program Example:

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 REM 11 LINES PER PAGE
40 PRINT #1,CHR$(27);"C";CHR$(11);
50 FOR I=1 TO 8
60 PRINT #1,"LINE NUMBER ";I;CHR$(10);
70 NEXT I
80 REM FEED PAPER TO NEXT TOF
90 PRINT #1,CHR$(12);
100 PRINT #1,"Next top of form position."
110 CLOSE
120 END
```



STEP 8. Horizontal Tab Setting

Horizontal tabs are set at every 8th column at power-on. The ESC D command allows horizontal tab positions to be set.

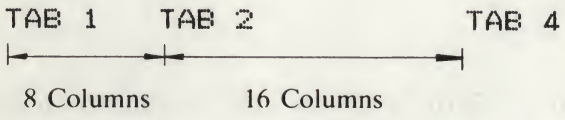
8-1. Horizontal tabs at power-on

Notice the horizontal tabs set at power-on by running the program below.

Program Example:

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,"TAB 1";
40 REM MOVE TO THE NEXT TAB
50 PRINT #1,CHR$(9);
60 PRINT #1,"TAB 2";
70 REM MOVE TO THE TAB AFTER NEXT
80 PRINT #1,CHR$(9);CHR$(9);
90 PRINT #1,"TAB 4"
100 CLOSE
110 END
```

Print Sample:



The number of columns between TAB2 and TAB4 is 16 because line 80 transmits 2 tab commands (CHR$(9)) to the printer.

8-2. Horizontal tabs by software control

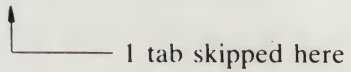
The program below shows how to set horizontal tab positions.

Program Example:

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,"01234567891111111111222222222233333333333";CHR$(10);
40 PRINT #1,"          012345678901234567890123456789";CHR$(10);
50 REM SET TAB POSITIONS
60 PRINT #1,CHR$(27);"D";CHR$(10);CHR$(20);CHR$(30);
70 PRINT #1,CHR$(40);CHR$(50);CHR$(0);
80 PRINT #1,"TAB 0";
90 REM MOVE TO THE NEXT TAB
100 PRINT #1,CHR$(9);"TAB 1";
110 REM MOVE TO THE TAB AFTER NEXT
120 PRINT #1,CHR$(9);CHR$(9);"TAB 3"
130 CLOSE
140 END
```

Print Sample:

```
01234567891111111111222222222233333333333
          012345678901234567890123456789
TAB 0     TAB 1                  TAB 3
```



The tab stop positioned at the 20th column is skipped due to an extra CHR$(9) command in line 120.

STEP 9. Margin Setting

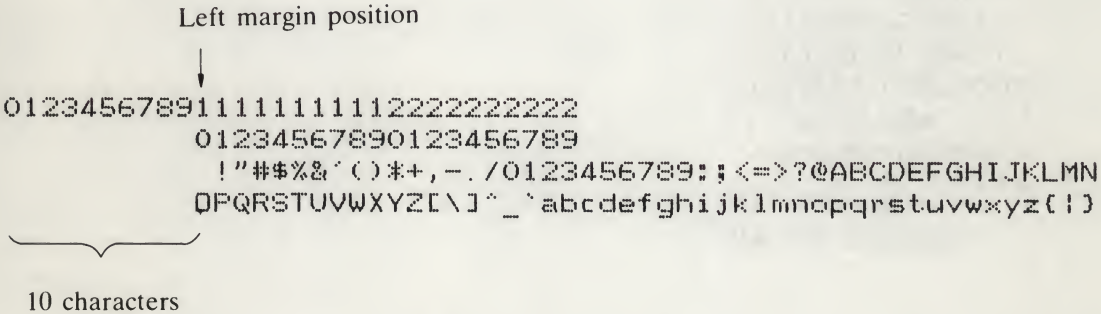
9-1. Left margin setting

Use the [ESC][ℓ] command to designate the number of characters to be skipped at the beginning of a line.

Program example for setting the left margin:

```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,"01234567891111111111222222222";CHR$(10);
40 PRINT #1,"          0123456789O123456789";CHR$(10);
50 REM LEFT MARGIN AT 10TH COLUMN
60 PRINT #1,CHR$(27);"l";CHR$(10);
70 FOR I=32 TO 78
80 REM OUTPUT CHARACTER CODES 32 TO 78
90 PRINT #1,CHR$(I);
100 NEXT I
110 PRINT #1,CHR$(10);
120 FOR I=79 TO 127
130 REM OUTPUT CHARACTER CODES 79 TO 127
140 PRINT #1,CHR$(I);
150 NEXT I
160 REM LINE FEED COMMAND
170 PRINT #1,CHR$(10);
180 REM CLEAR THE LEFT MARGIN
190 PRINT #1,CHR$(27);"l";CHR$(0);
200 CLOSE
210 END
```

The following is the print result:



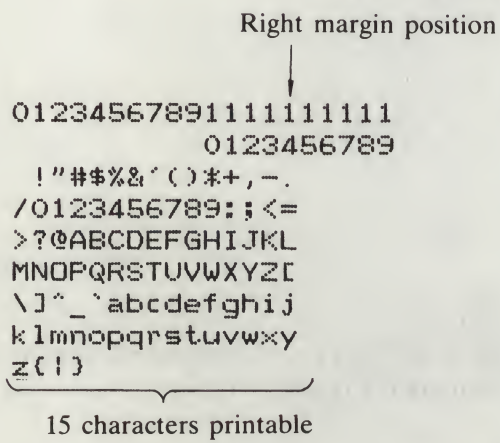
9-2. Right margin setting

Program example for setting the right margin:

```
10 OPEN"LPT1:" AS #1
20 WIDTH #1,255
30 PRINT #1,"012345678911111111111";CHR$(10);
40 PRINT #1,"          0123456789";CHR$(10);
50 REM RIGHT MARGIN AT 15TH COLUMN
60 PRINT #1,CHR$(27);"Q";CHR$(15);
70 FOR I=32 TO 127
80 REM OUTPUT CHARACTER CODES 32 TO 127
90 PRINT #1,CHR$(I);
100 NEXT I
110 REM LINE FEED COMMAND
120 PRINT #1,CHR$(10);
130 REM CLEAR THE RIGHT MARGIN
140 PRINT #1,CHR$(27);"Q";CHR$(80);
150 CLOSE
160 END
```

Line 140 clears the right margin by designating the right margin as being at the 80th column. 80 columns are the maximum number of character columns in a line for Draft Pica pitch.

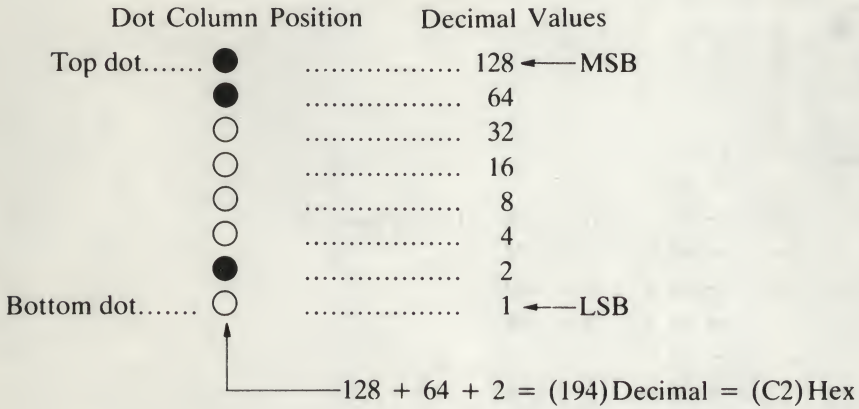
Print Sample:



STEP 10. Graphic Printing

Graphic commands allow the printer to draw any kind of picture by printing dots at any location on the page. This section describes how to input data for graphic printing.

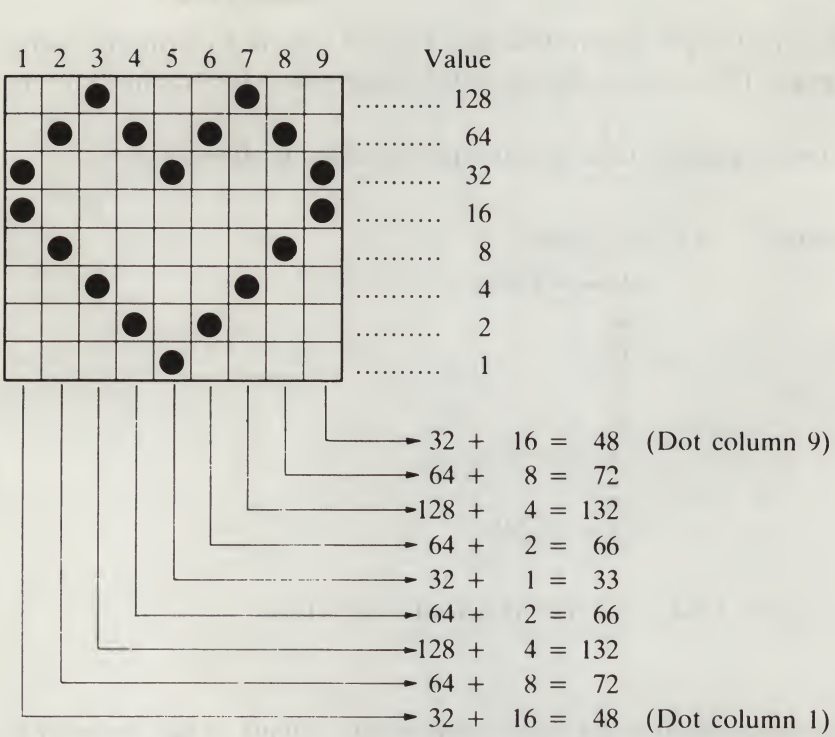
The relationship between graphic data and the printed dots is shown below:



"1" in the graphic data represents a dot and '0' represents a blank. Thus, in order to print the top dot, the D_7 bit of the graphic data must be 1. If you want to print the first, second and seventh dots from the top, the corresponding graphic data is to be calculated in the following manner:

128 (D_7) + 64 (D_6) + 2 (D_1) = 194 Decimal

Now we can work through a simple program. Try drawing a heart on graph paper.



The graphic data for dot column 1 is equal to that for dot column 9 because the dots to be printed are the same.

Input the following program and run it to obtain the heart mark.

Program example:

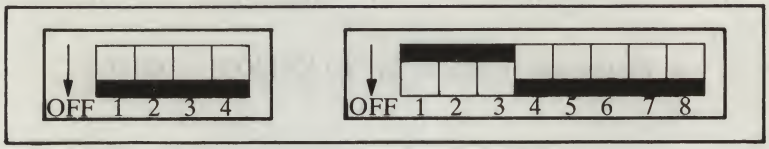
```
10 OPEN "LPT1:" AS #1
20 WIDTH #1,255
30 REM GRAPHIC PRINTING DESIGNATION
40 PRINT #1,CHR$(27);"K";CHR$(9);CHR$(0);
50 PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(66);
60 PRINT #1,CHR$(33);CHR$(66);CHR$(132);CHR$(72);CHR$(48);
70 PRINT #1,CHR$(10);
80 CLOSE
90 END
```

The above program will print the following:

The sample programs described thus far demonstrate how to use a few of the printer's basic features.
All the features are explained in detail in "CONTROL CODES".

DIP SWITCHES

The DIP switches are located at the back of the printer. They are covered by a small plastic insert. For most uses, these switches can be left as they were set at the factory. Each switch has two positions: when the switch is moved down, it is OFF; when it is moved up, it is ON. The DIP switches are read after the initialization process either by turning the power switch on or inputting the $\overline{\text{INITIAL}}$ signal of the parallel interface.



Switch 2 **Switch 1**

Switch	Function	On	Off	Factory Setting
1–1	International character	See Table 2		On
1–2				On
1–3				On
1–4	Page length	12″	11″	Off
1–5	Standard/IBM mode selection	IBM	Standard	Off
1–6	Character set selection in IBM mode	Character set 2	Character set 1	Off
	Download character in Standard mode	Valid	Invalid	
1–7	CR code selection	CR + LF	$\overline{\text{AUTO FEED}}$	Off
1–8	Slashed or unslashed zero	Ø	0	Off
2–1	1-inch skip perforation	Valid	Invalid	Off
2–2	Print mode	See Table 3		Off
2–3				Off
2–4	Not used			Off

Table 1

Note 1: Standard and IBM modes are selected only by using DIP switch 1-5. There is no control code to designate Standard or IBM mode.

Note 2: In Standard mode, the 1.5K-bytes RAM area is used as either download

International Characters Selected by DIP Switches

COUNTRY		U.S.A.	FRANCE	GERMANY	ENGLAND	DENMARK	SWEDEN	ITALY	SPAIN
DIP SWITCH	1-1	ON	ON	ON	ON	OFF	OFF	OFF	OFF
	1-2	ON	ON	OFF	OFF	ON	ON	OFF	OFF
	1-3	ON	OFF	ON	OFF	ON	OFF	ON	OFF
C O D E	(23) Hex (35) Decimal	#	#	#	£	#	#	#	Pt
	(24) H (36) D	$	$	$	$	$	¤	$	$
	(40) H (64) D	@	à	§	@	@	É	@	@
	(5B) H (91) D	[	°	Ä	[	Æ	Ä	°	¡
	(5C) H (92) D	\	Ç	Ö	\	Ø	Ö	\	Ñ
	(5D) H (93) D	]	§	Ü	]	Å	Å	é	¿
	(5E) H (94) D	^	^	^	^	^	Ü	^	^
	(60) H (96) D	`	`	`	`	`	é	ù	`
	(7B) H (123) D	{	é	ä	{	æ	ä	à	¨
	(7C) H (124) D	¦	ù	ö	¦	ø	ö	ò	ñ
	(7D) H (125) D	}	è	ü	}	å	å	è	}
	(7E) H (126) D	~	¨	β	~	~	ü	ì	~

Table 2

Note 1: These character selections are valid for all character sets: Standard character set, IBM character set 1, and IBM character set 2.

Note 2: When DENMARK is selected by the DIP switches in IBM character set 2 mode, code (9B) Hex, or (155) Decimal will print 'ø' and code (9D) Hex, or (157) Decimal will print 'Ø'.

```
U.S.A.      #$@[\]^`{¦}~
FRANCE      #$à°ç§^`éùè¨
GERMANY     #$§ÄÖÜ^`äöüß
ENGLAND     £$@[\]^`{¦}~
```

Print mode selected by DIP switches

DIP switch	Selected print mode			
	Pica (10 CPI)	Elite (12 CPI)	Condensed (17 CPI)	Proportional
2–2	Off	On	Off	On
2–3	Off	Off	On	On

Table 3

RUNNING THE SELF TEST

The self test is a built-in program that prints all of the characters alternately in Draft character mode for five lines and NLQ mode for five lines in a continuous pattern.

To start the self test, press and hold down the Front panel switch while turning the power on.

The printer is in the OFF-LINE state while performing the self-test. To stop the self-test, press the Front panel switch. When stopped, the printer returns to the ON-LINE state and the Power lamp goes on.

AUTOMATIC PRINTING FUNCTION

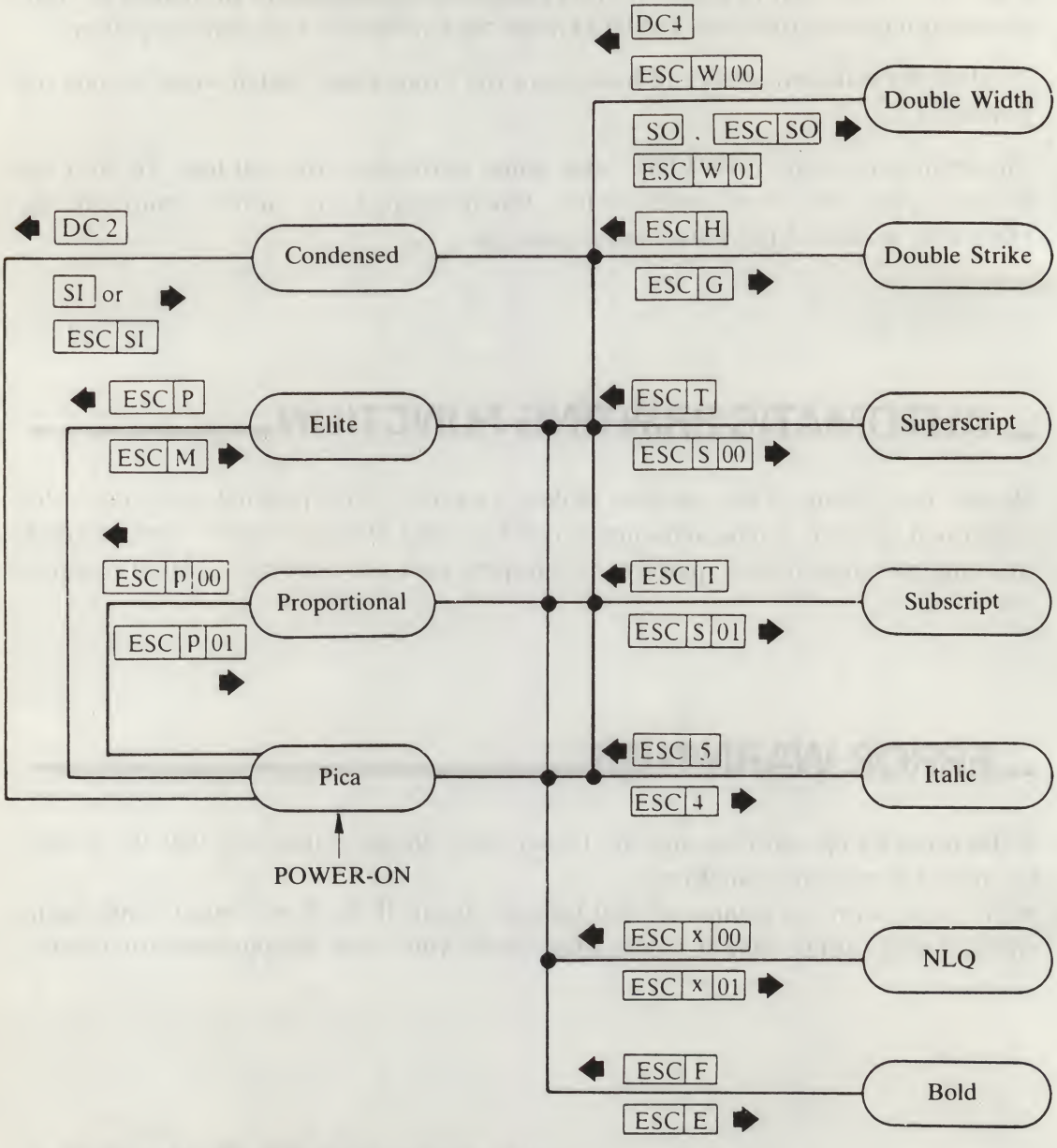
During data input, if the amount of data exceeds 1 line, printing is automatically performed. During graphic data input, if the amount of data exceeds 1 line, neither printing nor line feed is performed. Graphic data that exceeds 1 line is ignored.

ERROR WARNINGS

If the printer stops printing and the Power lamp blinks, it indicates that the printer has detected an error condition.
In this case, turn the printer off and back on again. If the Power lamp blinks again and still won't print, take it to the store where you made the purchase for repair.

PRINT MODE FLOWCHART

Pica Character mode is automatically selected at power-on.



In print mode the following priorities exist.

1. Elite > Proportional > Bold > Condensed > Pica
2. Superscript/Subscript > NLQ > Double Strike

For greater detail refer to the Character Category Priority Table.

*: Includes half dot

Print Mode		Character Structure H × V + Space	Maximum Number of Columns	Character Spacing CPI	Printing Speed CPS	Minimum Dot Spacing H × V inches	Character Size H × V mm (dot)	Number of passes
Draft	Pica	12* × 9	80	10	100	1/120* × 1/72	2.1 × 2.5 (9*×7)	1
	Elite	12* × 9	96	12	50	1/144* × 1/72	1.8 × 2.5 (9*×7)	1
	Condensed	14* × 9	137	17	70	1/240* × 1/72	1.2 × 2.5 (9*×7)	1
NLQ	Pica	24* × 18	80	10	20	1/240* × 1/144	2.3 × 2.5 (19*×13)	2
	Elite	24* × 18	96	12	24	1/288* × 1/144	2.0 × 2.5 (19*×13)	2
Draft Italic	Pica	16* × 9	80	10	100	1/240* × 1/72	2.7 × 2.5	1
	Elite	16* × 9	96	12	50	1/288* × 1/72	2.3 × 2.5	1
	Condensed	18* × 9	137	17	70	1/240* × 1/72	1.9 × 2.5	1
NLQ Italic	Pica	32* × 18	80	10	20	1/480* × 1/144	2.9 × 2.5	2
	Elite	32* × 18	96	12	24	1/576* × 1/144	2.5 × 2.5	2
Graphics	Standard density	n×8 or 9	480 dot	–	597 dot/s	1/60 × 1/72	–	1
	Double-density	n×8 or 9	960 dot	–	490 dot/s	1/120 × 1/72	–	1
	Double-speed, Double-density	n×8	960* dot	–	1200* dot/s	1/120* × 1/72	–	1
	Quadruple-density	n×8	1920* dot	–	960* dot/s	1/240* × 1/72	–	1
	576 dot	n×8	576 dot	–	294 dot/s	1/72 × 1/72	–	1
	640 dot	n×8	640 dot	–	326 dot/s	1/80 × 1/72	–	1
	720 dot	n×8	720 dot	–	367 dot/s	1/90 × 1/72	–	1
	1152 dot	n×8	1152 dot	–	588 dot/s	1/144 × 1/72	–	1

1. Draft Pica	ABCDEFGHIJKLMNopqrstuvwxyz
2. Draft Elite	ABCDEFGHIJKLMNopqrstuvwxyz
3. Draft Condensed	ABCDEFGHIJKLMNopqrstuvwxyz
4. NLQ Pica	ABCDEFGHIJKLMNopqrstuvwxyz
5. NLQ Elite	ABCDEFGHIJKLMNopqrstuvwxyz
6. Draft Italic Pica	*ABCDEFGHIJKLMNopqrstuvwxyz*
7. Draft Italic Elite	*ABCDEFGHIJKLMNopqrstuvwxyz*
8. Draft Italic Condensed	*ABCDEFGHIJKLMNopqrstuvwxyz*
9. NLQ Italic Pica	*ABCDEFGHIJKLMNopqrstuvwxyz*
10. NLQ Italic Elite	*ABCDEFGHIJKLMNopqrstuvwxyz*

CONTROL CODES

Program examples in this chapter are for the IBM-PC, when U.S.A. font is selected.

• Print Commands

1. CR (13) Decimal (0D) Hexadecimal

Input of this code initiates printing. If DIP switch 1-7 is ON, a linefeed is performed after printing. If print data is not input or if the input data is all space code, the print head does not move. The print data that is input after this command is printed at the left margin. In Standard mode, the SO or ESC SO double-width mode is terminated, if a linefeed is executed by this command.
In IBM mode, the ESC 5 n command determines whether a linefeed is performed by this command, and the SO or ESC SO double-width mode is always terminated.

Example:

```
10 REM CARRIAGE RETURN (CR)
20 REM THIS COMMAND INITIATES PRINTING AND RETURN
30 REM PRINT HEAD TO LEFT COLUMN
40 OPEN "LPT1:" AS #1
50 WIDTH #1,255
60 FOR I=1 TO 3
70 PRINT #1,"PRINT AND...";CHR$(13);
80 PRINT #1,"              RETURN";CHR$(13);
90 NEXT I
100 CLOSE
110 END
```

Program list

```
PRINT AND...RETURN
```

Printed sample

2. LF **(10) Decimal (0A) Hex**

Input of this code results in printing and a linefeed. The linefeed width is set by the linefeed amount command. If print data has not been input or if the input data is all space code, only a linefeed is performed. Print data that is input after this print command is printed at the left margin.

This command terminates the double-width character mode set by the SO or ESC SO command.

```
10 REM LINEFEED (LF)
20 REM THIS COMMAND INITIATES PRINTING AND
30 REM FEEDS THE PAPER ONE LINE
40 OPEN "LPT1:" AS #1
50 WIDTH #1,255
60 FOR I=1 TO 3
70 PRINT #1,"LINE ";I;CHR$(10);
80 PRINT #1,"NEXT LINE";CHR$(10);
90 NEXT I
100 CLOSE
110 END
```

```
LINE  1
NEXT LINE
LINE  2
NEXT LINE
LINE  3
NEXT LINE
```

3. FF (12) Decimal (0C) Hex

Input of this code results in printing and linefeeds being performed until the top of the next page is reached. The form feed value (1 page length) can be designated by DIP switch 1-4 at power-on.
This value can be altered by the ESC C command after power-on. The double-width character mode set by the SO or ESC SO command will be terminated if the FF command is input.

```
10 REM FORM FEED (FF)
20 REM THIS COMMAND FEEDS THE PAPER
30 REM TO THE NEXT TOP OF FORM POSITION
40 OPEN "LPT1:" AS #1
50 WIDTH #1,255
60 REM SET PAGE LENGTH TO 1 INCHES
70 PRINT #1,CHR$(27);"C";CHR$(0);CHR$(1);
80 PRINT #1,"THIS IS THE TOP OF PAGE 1";CHR$(10);
90 PRINT #1,"THE DOT MATRIX PRINTER";CHR$(13);
100 REM USE FF TO FEED TO THE NEXT TOP OF FORM
110 PRINT #1,CHR$(12);
120 PRINT #1,"THIS IS THE TOP OF PAGE 2";CHR$(13);
130 PRINT #1,CHR$(12);
140 PRINT #1,"THIS IS THE TOP OF PAGE 3";CHR$(10);
150 CLOSE
160 END
```

```
THIS IS THE TOP OF PAGE 1
THE DOT MATRIX PRINTER



THIS IS THE TOP OF PAGE 2



THIS IS THE TOP OF PAGE 3
```

4. VT (11) Decimal (0B) Hex

Input of this code initiates printing and performs a paperfeed until the next vertical tab that was previously set by the ESC B or ESC b command.
If a vertical tab is not set, this command performs the same operation as the LF code. If at least one vertical tab is set and there is no setting until the next page, a paperfeed is carried out until the top of the next page is reached.
The double-width character mode set by the SO or ESC SO command is terminated after executing this command.

```
10 REM VERTICAL TAB  (VT/ESC,B,n1...nK,0)
20 REM THIS COMMAND EXECUTES VERTICAL TABULATION
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 REM SET PAGE LENGTH TO 2 INCHES
60 PRINT #1,CHR$(27);"C";CHR$(0);CHR$(2);
70 REM SET VERTICAL TABS AT LINE 2, 8, AND 10
80 PRINT #1,CHR$(27);"B";CHR$(1);CHR$(7);CHR$(9);CHR$(0);
90 FOR I=1 TO 2
100 PRINT #1,"LINE 0";CHR$(11);
110 PRINT #1,"LINE 1";CHR$(11);
120 PRINT #1,"LINE 8";CHR$(11);
130 PRINT #1,"LINE 9";CHR$(11);
140 NEXT I
150 CLOSE
160 END
```

```
LINE 0
LINE 1




LINE 8

LINE 9


LINE 0
LINE 1




LINE 8

LINE 9
```

5. ESC J n **(27, 74, n) Decimal (1B, 4A, n) Hex**

n is an 8-bit binary code, $0 \leq n \leq 255$

Input of this code performs printing and an n/144 or n/216 inch linefeed. The amount of linefeed is not stored in the printer. In Standard mode, print data that is input after this command is printed at the next column of the last line.
In IBM mode, print data is printed at the left margin.
n/144 or n/216 inch is designated by the GS n command. n/216 inch is selected at power-on.

```
10 REM PROGRAMMABLE LINEFEED (ESC,J,n)
20 REM n/144 OR n/216 INCH LINEFEED
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 FOR I=1 TO 5
60 PRINT #1,"36/216 INCH LINE FEED"
70 PRINT #1,CHR$(27);"J";CHR$(36);
80 NEXT I
90 PRINT #1,CHR$(10);
100 REM SET 36/144 INCH LINE FEED
110 PRINT #1,CHR$(29);CHR$(1);
120 FOR I=1 TO 5
130 PRINT #1,"36/144 INCH LINE FEED"
140 PRINT #1,CHR$(27);"J";CHR$(36);
150 NEXT I
160 PRINT #1,CHR$(10);
170 REM SET 36/216 INCH LINEFEED AGAIN
180 PRINT #1,CHR$(29);CHR$(0);
190 FOR I=1 TO 5
200 PRINT #1,"36/216 INCH LINE FEED"
210 PRINT #1,CHR$(27);"J";CHR$(36);
220 NEXT I
230 PRINT #1,CHR$(10);
240 CLOSE
250 END
```

```
36/216 INCH LINE FEED
36/216 INCH LINE FEED
36/216 INCH LINE FEED
36/216 INCH LINE FEED
36/216 INCH LINE FEED

36/144 INCH LINE FEED

36/144 INCH LINE FEED

36/144 INCH LINE FEED

36/144 INCH LINE FEED

36/144 INCH LINE FEED


36/216 INCH LINE FEED
```

6. ESC j n **(27, 106, n) Decimal (1B, 6A, n) Hex**
n is an 8-bit binary code, $0 \leq n \leq 255$

Input of this code performs printing and a reverse linefeed of n/144 or n/216 inch. The amount of linefeed is not stored in the printer. In Standard mode, print data that is input after this command is printed at the next column of the last line. In IBM mode, print data is printed at the left margin.
The GS n command designates n/144 or n/216 inch. n/216 inch is selected at power-on.

```
10 REM PROGRAMMABLE REVERSE LINEFEED (ESC,j,n)
20 REM THIS EXAMPLE DEFAULTS TO n/216 INCH REVERSE LINEFEED
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 FOR I=1 TO 12:PRINT #1,CHR$(10);:NEXT I
60 FOR I=20 TO 180 STEP 40
70 PRINT #1,"LF";I;"/216";CHR$(34);
80 PRINT #1,CHR$(27);"j";CHR$(I);
90 NEXT I
100 PRINT #1,CHR$(10);
110 CLOSE
120 END
```

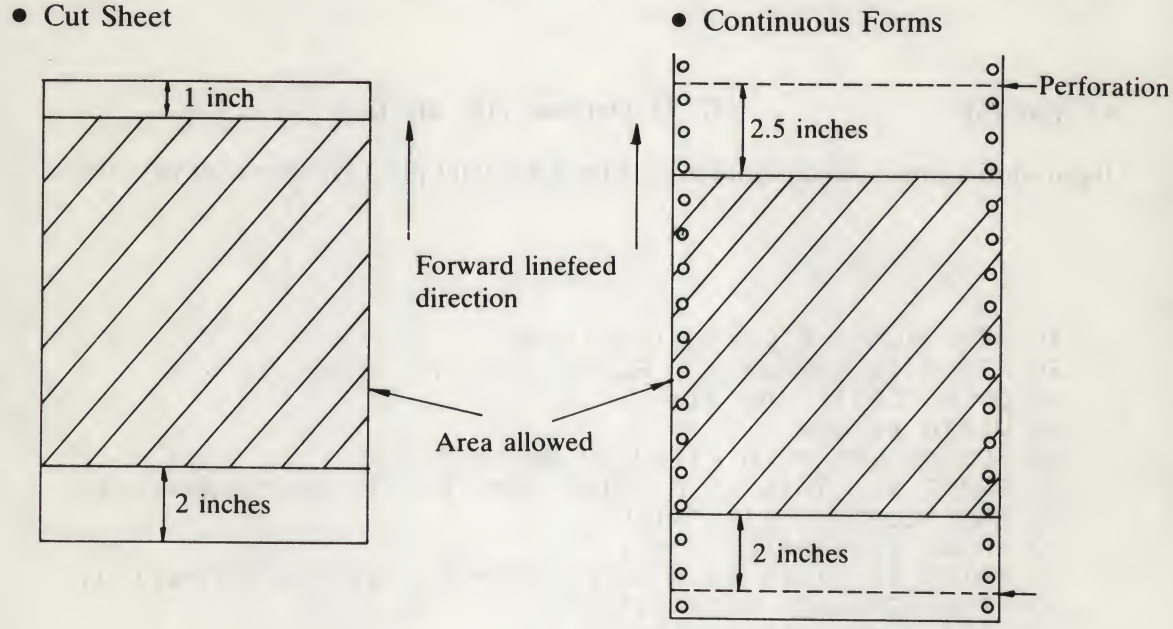
```
                                                LF 180 /216"

                                        LF 140 /216"

                                LF 100 /216"

LF 20 /216"LF 60 /216"
```

Limited area allowed to perform reverse linefeeds.



Note: When using the tractor unit for continuous forms, a maximum of 2 reverse linefeeds can be performed within the above limited area.

• Character Mode Designation

7. ESC P **(27, 80) Decimal (1B, 50) Hex**

Input of this command terminates the Elite Character pitch.

8. ESC M **(27, 77) Decimal (1B, 4D) Hex**

Input of this command designates the Elite Character pitch (12 character per inch).

```
10 REM SELECT PICA/ELITE PITCHES
20 REM PICA (ESC,P)     ELITE (ESC,M)
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 REM SELECT PICA PITCH BY DEFAULT
60 PRINT #1,"THIS IS A PRINT SAMPLE - 10 CPI";CHR$(10);
70 REM SELECT ELITE PITCH
80 PRINT #1,CHR$(27);"M";
90 PRINT #1,"THIS IS A PRINT SAMPLE - 12 CPI";CHR$(10);
100 REM RESELECT PICA PITCH
110 PRINT #1,CHR$(27);"P";
120 PRINT #1,"THIS IS A PRINT SAMPLE - 10 CPI";CHR$(10);
130 CLOSE
140 END
```

```
THIS IS A PRINT SAMPLE - 10 CPI
THIS IS A PRINT SAMPLE - 12 CPI
THIS IS A PRINT SAMPLE - 10 CPI
```

9. [SI] (15) Decimal (0F) Hex

Input of this command designates the Condensed Character pitch.

```
10 REM CONDENSED CHARACTERS (SI OR ESC,SI)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM SET CONDENSED PICA
50 PRINT #1,CHR$(15);
60 PRINT #1,"CONDENSED PICA - 17 CPI";CHR$(10);
70 REM RELEASES CONDENSED PRINT
80 PRINT #1,CHR$(18);
90 PRINT #1 ,"ASCII 18 (DC2) RELEASES CONDENSED PRINT"
100 PRINT #1,CHR$(10)
110 CLOSE
120 END
```

```
CONDENSED PICA - 17 CPI
ASCII 18 (DC2) RELEASES CONDENSED PRINT
```

10. [ESC][SI] (27, 15) Decimal (1B, 0F) Hex

This command is the same as the [SI] command.

Refer to 9.

11. [DC2] (18) Decimal (12) Hex

Input of this command terminates the Condensed Character pitch designated by the [SI] or [ESC][SI] command.

Refer to 9.

12. | ESC | x | 1 | or (1) | **(27, 120, 49 or 1) Decimal (1B, 78, 31 or 01) Hex**

Input of this command designates the Near Letter Quality Character mode and turns the NLQ lamp on.
While in the Condensed Character mode, if this command is performed, Draft Characters are printed even though the NLQ lamp is on.
When the Condensed Character mode is terminated, NLQ printing is performed.

13. | ESC | x | 0 | or (0) | **(27, 120, 48 or 0) Decimal (1B, 78, 30 or 00) Hex**

Input of this command terminates the Near Letter Quality mode and turns the NLQ lamp off.
After this command is input the printer returns to the Draft Character mode.

```
10 REM SELECT NLQ FONT (ESC,x,1)
20 REM THIS COMMAND CONTROLS THE NLQ LED
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 PRINT #1,"Print sample in draft Pica"
60 PRINT #1,CHR$(10);
70 PRINT #1,CHR$(27);"x";CHR$(1);
80 PRINT #1,"Print sample in NLQ Pica"
90 REM RELEASE NLQ
100 PRINT #1,CHR$(27);"x";CHR$(0);
110 PRINT #1,CHR$(10);
120 PRINT #1,CHR$(27);"M";
130 PRINT #1,"Print sample in draft Elite"
140 PRINT #1,CHR$(10);
150 PRINT #1,CHR$(27);"x";CHR$(1);
160 PRINT #1,"Print sample in NLQ Elite"
170 PRINT #1,CHR$(10);
180 PRINT #1,CHR$(27);"x";CHR$(0)
190 CLOSE
200 END
```

```
Print sample in draft Pica
Print sample in NLQ Pica
Print sample in draft Elite
Print sample in NLQ Elite
```

14. ESC | p | 1 or (1) **(27, 112, 49 or 1) Decimal (1B, 70, 31 or 01) Hex**

Input of this command designates Proportional Spacing where the space between characters varies. When comparing the Draft and NLQ Character modes, notice must be taken of the character widths and spacings that differ. The BS and DEL codes are ignored while in Proportional Spacing.

15. ESC | p | 0 or (0) **(27, 112, 48 or 0) Decimal (1B, 70, 30 or 00) Hex**

Input of this command terminates the Proportional Spacing.

```
10 REM SELECT PROPORTIONAL SPACING (ESC,p,1)
20 REM SPACING BETWEEN CHARACTERS IS PROPORTIONAL
30 REM TO THE SIZE OF THE CHARACTER
40 OPEN "LPT1:" AS #1
50 WIDTH #1,255
60 PRINT #1,"Sample printout in draft Pica";CHR$(10);
70 REM SELECT PROPORTINAL SPACING
80 PRINT #1,CHR$(27);"p";CHR$(1);
90 PRINT #1,"Sample printout with Proportional Spacing";CHR$(10);
100 PRINT #1,CHR$(27);"p";CHR$(0);
110 PRINT #1,CHR$(27);"x";CHR$(1);
120 PRINT #1,"Sample printout in NLQ Pica";CHR$(10);
130 PRINT #1,CHR$(27);"p";CHR$(1);
140 PRINT #1,"Sample printout with NLQ and Proportional Spacing";
150 PRINT #1,CHR$(10);
160 PRINT #1,CHR$(27);"p";CHR$(0);CHR$(27);"x";CHR$(0)
170 CLOSE
180 END
```

```
Sample printout in draft Pica
Sample printout with Proportional Spacing
Sample printout in NLQ Pica
Sample printout with NLQ and Proportional Spacing
```

16. | ESC | S | 0 or (0) | **(27, 83, 48 or 0) Decimal (1B, 53, 30 or 00) Hex**

Input of this command designates the Superscript Character mode.

17. | ESC | S | 1 or (1) | **(27, 83, 49 or 1) Decimal (1B, 53, 31 or 01) Hex**

Input of this command designates the Subscript Character mode.

18. | ESC | T | **(27, 84) Decimal (1B, 54) Hex**

Input of this command terminates the Superscript/Subscript Character mode. The Superscript/Subscript Character mode reduces a Draft character to 1/2 its original height. The characters are the same in either Draft or NLQ character mode.
If Proportional Spacing is designated while in the Superscirpt/Subscript character mode, character widths and spacings become the same as in the Draft Characters mode. Thus if both Superscript/Subscript and Proportional Spacing are designated while in the NLQ character mode, character widths and spacing between characters are different from the case in which the Superscript/Subscript Character mode is not designated.

```
10 REM SUBSCRIPT (ESC,S,1) AND SUPERSCRIPT (ESC,S,0)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"S";CHR$(1);
50 PRINT #1,"Subscript";
60 PRINT #1,CHR$(27);"T";
70 PRINT #1," Draft Pica ";
80 PRINT #1,CHR$(27);"S";CHR$(0);
90 PRINT #1,"Superscript"
100 PRINT #1,CHR$(10);
110 CLOSE
120 END
```

```
Subscript Draft Pica Superscript
```

19. ESC 4 **(27, 52) Decimal (1B, 34) Hex**

This command is valid only in Standard mode. Input of this command designates the Italic Character mode. All character data following this command is printed in italic. This command is ignored during the printing of graphic data.

20. ESC 5 **(27, 53) Decimal (1B, 35) Hex**

This command is valid only in Standard mode. Input of this command terminates the Italic Character mode.

```
10 REM ITALIC CHARACTER (ESC,4)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"4";
50 PRINT #1,"ITALIC CHARACTER";CHR$(10);
60 PRINT #1,CHR$(27);"5";
70 PRINT #1,"DRAFT PICA CHARACTER"
80 CLOSE
90 END
```

ITALIC CHARACTER
DRAFT PICA CHARACTER

21. **ESC ! n** **(27, 33, n) Decimal (1B, 21, n) Hex**

$0 \leq n \leq 255$

Input of this command designates mixed modes of the Elite, Proportional, Condensed, Emphasized, Double-strike, Double-width, Italic, and Underline modes by changing the value of n. When this command is performed, all previously set modes except NLQ and Superscript/Subscript modes are cleared and modes designated by n are set. Each bit of n designates the following modes.

	MSB							LSB
n =	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
	128	64	32	16	8	4	2	1

D_7: Underline ..... MSB (Most Significant Bit)
D_6: Italic
D_5: Double-width
D_4: Double-strike
D_3: Emphasized
D_2: Condensed
D_1: Proportional
D_0: Elite ..... LSB (Least Significant Bit)

For greater detail refer to the "CHARACTER CATEGORY TABLE" character on page 117.

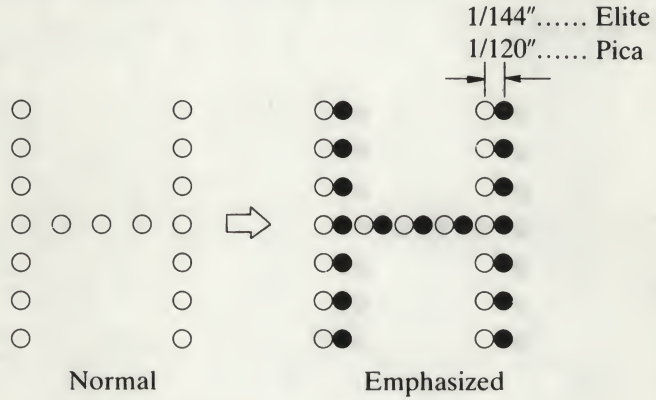
Note: Outputting (26) D code to the printer from the IBM PC.

```
1000 REM OUTPUT 26 SUBROUTINE FOR PARALLEL PRINTER ADAPTER
1010 A=INP(889) AND 128
1020 IF A=0 THEN GOTO 1010
1030 OUT 888,26
1040 OUT 890,13
1050 OUT 890,12
1060 RETURN
```

•Emphasized Character

22. ESC E **(27, 69) Decimal (1B, 45) Hex**

Input of this command designates the Emphasized Character mode. In this mode, the print head moves half a dot to the right to re-print the same dot column. If this command is set while in the Condensed Character pitch, Emphasized Pica (10 cpi) characters are printed. If the Emphasized Character mode is first terminated by the ESC F command, the printer returns to the Condensed Character mode (17 cpi). (This is true even when the condensed character mode is selected by switches.)




```
10 REM EMPHASIS PRINTING (ESC,E)
20 REM SINGLE PASS PRINTING
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 PRINT #1,CHR$(27);"E";
60 PRINT #1,"EMPHASIZED PRINTING";CHR$(10);
70 PRINT #1,CHR$(27);"F";
80 PRINT #1,"NORMAL PRINTING"
90 CLOSE
100 END
```

```
EMPHASIZED PRINTING
NORMAL PRINTING
```

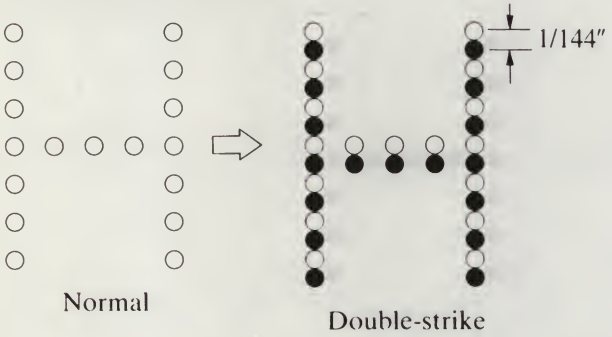
23. ESC F **(27, 70) Decimal (1B, 46) Hex**

Input of this command terminates the Emphasized Character mode.

• Double-strike Character

24. ESC G (27, 71) Decimal (1B, 47) Hex

Input of this command designates the Double-strike Character mode. In this mode, the paper is fed 1/144 inch and prints the same character once again. If the Double-strike Character mode is set and is overlapped with the Superscript/Subscript or the NLQ Character mode, the Superscript/Subscript mode or the NLQ Character mode is given priority. The printer returns to the Double-strike Character mode once the other modes are terminated.
The Double-strike function is only performed in a mode other than the Superscript/Subscript or NLQ mode.




```
10 REM DOUBLE STRIKE PRINTING (ESC,G)
20 REM DOUBLE PASS PRINTING
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 PRINT #1,CHR$(27);"G";
60 PRINT #1,"DOUBLE STRIKE PRINTING";CHR$(10);
70 PRINT #1,CHR$(27);"H";
80 PRINT #1,"NORMAL PRINTING"
90 CLOSE
100 END
```

```
DOUBLE STRIKE PRINTING
NORMAL PRINTING
```

25. ESC H (27, 72) Decimal (1B, 48) Hex

Input of this command terminates the Double-strike Character mode.

Refer to 24.

• Double-width Character

26. [SO] (14) Decimal (0E) Hex

Input of this command designates the Double-width Character mode. This command is invalid for graphic data. If more than a single line of character data is input, printing and a linefeed are automatically performed and this command is terminated. This command is also terminated by the [DC4], [ESC][W][n] or linefeed commands other than the [ESC][J][n] and [ESC][j][n] commands.

```
10 REM SINGLE-LINE DOUBLE WIDTH CHARACTERS (SO)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(14);
50 PRINT #1,"DOUBLE";CHR$(20);"  NORMAL  ";
60 PRINT #1,CHR$(14);"WIDTH";CHR$(10);
70 PRINT #1,"DOUBLE WIDTH SET BY <SO> IS CLEARED"
80 PRINT #1,CHR$(10);
90 PRINT #1,"BY EITHER DC4 OR A LF"
100 PRINT #1,CHR$(10);
110 PRINT #1,"--THE <SO> AND <ESC,SO> COMMANDS ARE THE SAME"
120 CLOSE
130 END
```

```
DOUBLE  NORMAL  WIDTH
DOUBLE WIDTH SET BY <SO> IS CLEARED
BY EITHER DC4 OR A LF
--THE <SO> AND <ESC,SO> COMMANDS ARE THE SAME
```

27. [ESC][SO] (27, 14) Decimal (1B, 0E) Hex

Same as the [SO] command.

Refer to 26.

28. [DC4] (20) Decimal (14) Hex

Input of this command terminates the Double-width Character mode command designated by the [SO] command.

Refer to 26.

29. ESC | W | 1 or (1) **(27, 87, 49 or 1) Decimal (1B, 57, 31 or 01) Hex**

Input of this command designates the Double-width Character mode that will not be terminated by a linefeed.

```
10 REM DOUBLE WIDTH CHARACTERS (ESC,W,1)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"W";CHR$(1);
50 PRINT #1,"DOUBLE WIDTH IS NOT CANCELLED";CHR$(10);
60 PRINT #1,"BY A LINE FEED --";CHR$(10);
70 PRINT #1,CHR$(27);"W";CHR$(0);
80 PRINT #1,"BUT IS RELEASED BY <ESC,W,0>"
90 CLOSE
100 END
```

```
DOUBLE WIDTH IS NOT CANCELLED
BY A LINE FEED --
BUT IS RELEASED BY <ESC,W,0>
```

30. ESC | W | 0 or (0) **(27, 87, 48 or 0) Decimal (1B, 57, 30 or 00) Hex**

Input of this command terminates the Double-width Character mode of ESC | W | 1 that is not terminated by a linefeed command. The Double-width Character mode designated by the SO command is also terminated.

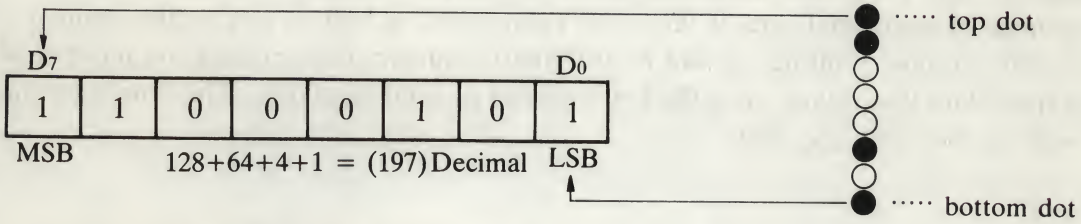
Refer to 29.

• Graphic Mode

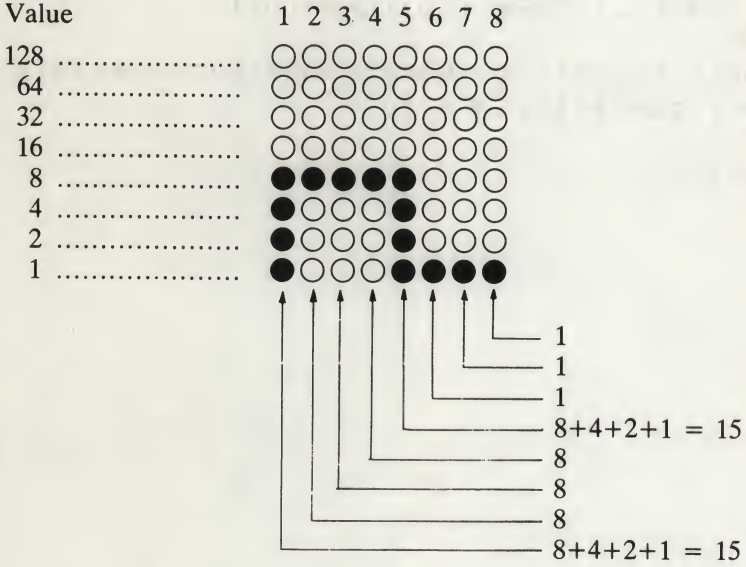
31. ESC | K | n1 | n2 **(27, 75, n1, n2) Decimal (1B, 4B, n1, n2) Hex**

Input of this command designates Standard-density Graphic printing. The maximum number of horizontal dots is 480. n1 and n2 are binary numbers that specify the graphic data number. The graphic data number is calculated as $n_1 + 256 \times n_2$. n2 is the high order byte and n1 is the low order byte. After this command, the printer returns to the prior print state. If n1 and n2 specify a number that exceeds a single line worth of dots, automatic printing is not performed and the excessive dots are cleared.

Graphic Data and the Corresponding Dots



Inputting the ESC | A | (8) command is useful in the graphic mode since patterns then appear continuous.

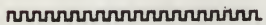



```
10 REM STANDARD DENSITY GRAPHICS (ESC,K,n1,n2)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"K";CHR$(160);CHR$(0);
50 FOR J=1 TO 20
60 PRINT #1,CHR$(15);CHR$(8);CHR$(8);CHR$(8);CHR$(15);
70 PRINT #1,CHR$(1);CHR$(1);CHR$(1);
80 NEXT J
90 PRINT #1,CHR$(10);
100 CLOSE
110 END
```

32. ESC | L | n1 | n2 **(27, 76, n1, n2) Decimal (1B, 4C, n1, n2) Hex**

Input of this command designates Double-density Graphic printing. The maximum number of horizontal dots is 960. The print speed is half as fast as the Standard-density Graphic printing. n1 and n2 are binary numbers that indicate the number of graphic data that follow. n1 is the low byte and n2 is the high byte. The others are the same as the ESC | K code.

```
10 REM DOUBLE DENSITY GRAPHICS (ESC,L,n1,n2)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"L";CHR$(160);CHR$(0);
50 FOR J=1 TO 20
60 PRINT #1,CHR$(15);CHR$(8);CHR$(8);CHR$(8);CHR$(15);
70 PRINT #1,CHR$(1);CHR$(1);CHR$(1);
80 NEXT J
90 PRINT #1,CHR$(10);
100 CLOSE
110 END
```



33. ESC Y n1 n2 (27, 89, n1, n2) Decimal (1B, 59, n1, n2) Hex

Input of this command designates the Double-speed Double-density Graphic printing. The maximum number of horizontal dots is 960. Horizontally aligned dots are not printed. Therefore, the number of dots that can be printed continuously in a horizontal direction is 480. The printer speed is the same as the Standard-density Graphic mode. The rest is the same as the ESC K command.

Example 1. Input data: (27, 89, 3, 0, 255, 255, 255) Decimal

The second dot column cannot be printed.

Example 2. Input data: (27, 89, 3, 0, 170, 85, 170) Decimal

All the dots specified in this case can be printed.

```
10 REM DOUBLE SPEED DOUBLE DENSITY GRAPHICS (ESC,Y,n1,n2)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"Y";CHR$(160);CHR$(0);
50 FOR J=1 TO 20
60 PRINT #1,CHR$(15);CHR$(8);CHR$(8);CHR$(8);CHR$(15);
70 PRINT #1,CHR$(1);CHR$(1);CHR$(1);
80 NEXT J
90 PRINT #1,CHR$(10);
100 CLOSE
110 END
```

34. ESC | Z | n1 | n2 **(27, 90, n1, n2) Decimal (1B, 5A, n1, n2) Hex**

Input of this command designates the Quadruple-density Graphic mode. The maximum number of horizontal dots is 1920. Horizontally aligned dots are not printed. Therefore, the number of dots that can be printed continuously in a horizontal direction is 960. The printing speed is the same as the Double-density Graphic speed. The rest is the same as the ESC | K command.

```
10 REM QUADRUPLE DOUBLE DENSITY GRAPHICS (ESC,Z,n1,n2)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"Z";CHR$(160);CHR$(0);
50 FOR J=1 TO 20
60 PRINT #1,CHR$(15);CHR$(8);CHR$(8);CHR$(8);CHR$(15);
70 PRINT #1,CHR$(1);CHR$(1);CHR$(1);
80 NEXT J
90 PRINT #1,CHR$(10);
100 CLOSE
110 END
```

35. ESC | * | m | n1 | n2 **(27, 42, m, n1, n2) Decimal (1B, 2A, m, n1, n2) Hex**

Input of this command allows Graphic types to be printed. As shown below in the table, m determines the following print types. As in the ESC | K command, n1 and n2 are the Graphic Data numbers. When m ≥ 8, the five bytes of this command and the number of bytes of the following graphic data designated by n1 and n2 are ignored.

m	Graphic Type	1 Line Dot Number (8 inch)	Horizontal Dot Spacing	Vertical: Horizontal	Equivalent Commands
0	Standard-density Graphic	480 dots	1/60 inch	1:1.2	ESC, K
1	Double-density Graphic	960 dots	1/120 inch	1:0.6	ESC, L
2	Double-speed Double-density Graphic	960 dots	1/120 inch	1:0.6	ESC, Y
3	Quadruple-density Graphic	1920 dots	1/240 inch	1:0.3	ESC, Z
4	640 Dot Graphic	640 dots	1/80 inch	1:0.9	—
5	576 Dot Graphic	576 dots	1/72 inch	1:1	—
6	720 Dot Graphic	720 dots	1/90 inch	1:0.8	—
7	1152 Dot Graphic	1152 dots	1/144 inch	1:0.5	—

```
10 REM 8-PIN GRAPHICS MODE (ESC,*,n1,n2)
20 REM SELECTS 8 DIFFERENT GRAPHICS DENSITIES
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 FOR M=0 TO 7
60 PRINT #1,"   (MODE m = ";M;")    ";
70 PRINT #1,CHR$(27);"*";CHR$(M);CHR$(160);CHR$(0);
80 FOR J=1 TO 20
90 PRINT #1,CHR$(15);CHR$(8);CHR$(8);CHR$(8);CHR$(15);
100 PRINT #1,CHR$(1);CHR$(1);CHR$(1);
110 NEXT J
120 PRINT #1,CHR$(10);
130 NEXT M
140 CLOSE
150 END
```

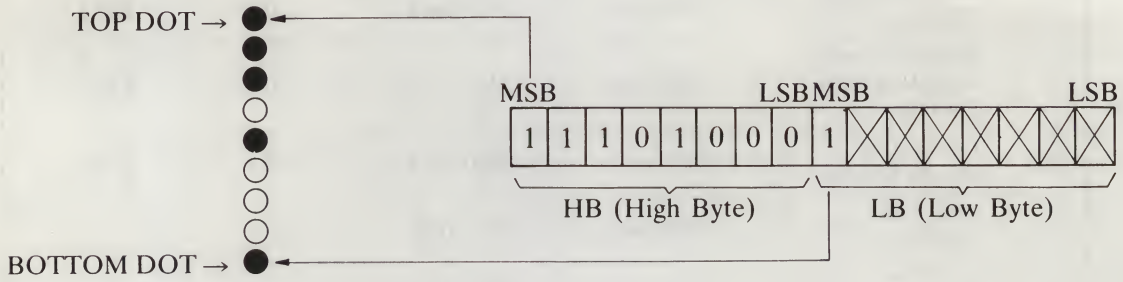
```
(MODE m =  0 )
(MODE m =  1 )
(MODE m =  2 )
(MODE m =  3 )
(MODE m =  4 )
```

36. ESC ^ a n1 n2 HB LB

(27, 94, a, n1, n2) Decimal (1B, 5E, a, n1, n2) Hex

Input of this command designates the 9-pin graphic mode.
The maximum number of horizontal dots is 480 when a = 0 and it is 960 when a = 1. Since 1 dot column is composed of 9 vertical dots, 2 bytes are used to designate a data. The rest is the same as the ESC K command.

Example: ☒: Don't care




```
10 REM 9-PIN GRAPHICS MODE (ESC,^,a,n1,n2)
20 REM SELECTS 8 DIFFERENT GRAPHICS DENSITIES
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 FOR A=0 TO 1
60 PRINT #1,"   (MODE a = ";A;")    ";
70 PRINT #1,CHR$(27);"^";CHR$(A);CHR$(160);CHR$(0);
80 FOR J=1 TO 20
90 PRINT #1,CHR$(15);CHR$(128);CHR$(8);CHR$(128);
100 PRINT #1,CHR$(8);CHR$(128);CHR$(8);CHR$(128);
110 PRINT #1,CHR$(15);CHR$(128);CHR$(1);CHR$(128);
120 PRINT #1,CHR$(1);CHR$(128);CHR$(1);CHR$(128);
130 NEXT J
140 PRINT #1,CHR$(10);
150 NEXT A
160 CLOSE
170 END
```

```
(MODE a =  0 )
(MODE a =  1 )
```

37. ESC ? n m **(27, 63, n, m) Decimal (1B, 3F, n, m) Hex**

n = K, L, Y, Z $0 \leq m \leq 7$

Input of this command assigns one of the graphic modes listed under the ESC * command section to any one of the ESC K, ESC L, ESC Y, and ESC Z commands that will be input later. Refer to m in the ESC * command which is identical to m in this command.

m	Graphic Type
0	Standard-density
1	Double-density
2	Double-speed Double-density
3	Quadruple-density
4	640 dots
5	576 dots
6	720 dots
7	1152 dots

```
10 REM GRAPHICS MODE REASSIGNMENT
20 REM THIS COMMAND ENABLES YOU TO REASSIGN
30 REM GRAPHI DENSITIES
40 OPEN "LPT1:" AS #1
50 WIDTH #1,255
60 REM SET STANDARD DENSITIES GRAPHICS
70 PRINT #1,"NORMAL ASSIGNMENT";CHR$(10);
80 PRINT #1,CHR$(27);"K";CHR$(120);CHR$(0);
90 FOR I=1 TO 15
100 PRINT #1,CHR$(0);CHR$(24);CHR$(36);CHR$(66);
110 PRINT #1,CHR$(66);CHR$(36);CHR$(24);CHR$(0);
120 NEXT I
130 PRINT #1,CHR$(10);
140 REM REASSIGN ESC,K,n1,n2 TO QUAD.DENSITY
150 PRINT #1,"ESK,K,n1,n2 REASSIGNED TO QUAD. DENSITY";CHR$(10);
160 PRINT #1,CHR$(27);"?";"K";CHR$(3);
170 PRINT #1,CHR$(27);"K";CHR$(120);CHR$(0);
180 FOR I=1 TO 15
190 PRINT #1,CHR$(0);CHR$(24);CHR$(36);CHR$(66);
200 PRINT #1,CHR$(66);CHR$(36);CHR$(24);CHR$(0);
210 NEXT I
220 PRINT #1,CHR$(10);
230 CLOSE
240 END
```

```
NORMAL ASSIGNMENT
```

• Linefeed Pitch

38. ESC 0 **(27, 48) Decimal (1B, 30) Hex**

Input of this command designates a linefeed value of 1/8 inch.

```
10 REM LINE FEED TO 1/8 INCH (ESC,0)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"0";
50 FOR I=1 TO 8
60 PRINT #1,"8 LINES TO THE INCH";CHR$(10);
70 NEXT I
80 CLOSE
90 END
```

```
8 LINES TO THE INCH
8 LINES TO THE INCH
8 LINES TO THE INCH
8 LINES TO THE INCH
8 LINES TO THE INCH
8 LINES TO THE INCH
8 LINES TO THE INCH
8 LINES TO THE INCH
```

39. ESC 1 **(27, 49) Decimal (1B, 31) Hex**

Input of this command designates a linefeed value of 7/72 inches.

```
10 REM SET LINE FEED TO 7/72 INCH (ESC,1)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"1";
50 FOR I=1 TO 6
60 PRINT #1,"7/72 INCH LINE FEED";CHR$(10);
70 NEXT I
80 CLOSE
90 END
```

```
7/72 INCH LINE FEED
7/72 INCH LINE FEED
7/72 INCH LINE FEED
7/72 INCH LINE FEED
7/72 INCH LINE FEED
7/72 INCH LINE FEED
```

40. ESC 2 **(27, 50) Decimal (1B, 32) Hex**

Standard Mode: This code sets the linefeed value to 1/6 inch.
IBM Mode: The linefeed value specified by the ESC A n command is actually set when this code is input.

```
10 REM SET LINE FEED TO 1/6 INCH (ESC,2)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"2";
50 FOR I=1 TO 6
60 PRINT #1,"6 LINES TO THE INCH";CHR$(10);
70 NEXT I
80 CLOSE
90 END
```

```
6 LINES TO THE INCH
6 LINES TO THE INCH
6 LINES TO THE INCH
6 LINES TO THE INCH
6 LINES TO THE INCH
6 LINES TO THE INCH
```

41. ESC 3 n **(27, 51, n) Decimal (1B, 33, n) Hex**

$0 \leq n \leq 255$

This code sets the linefeed value to n/144 or n/216 inch which is designated, respectively, by the GS (1) and GS NUL commands. n/216 of an inch is the power-on default.

```
10 REM SET PROGRAMMABLE LINE FEED (ESC,3,n)
20 REM THIS COMMAND CAN ISSUE EITHER A
30 REM n/216 OR n/144 INCH LINE FEED
40 OPEN "LPT1:" AS #1
50 WIDTH #1,255
60 FOR I=1 TO 6
70 PRINT #1,CHR$(27);"3";CHR$(36);
80 PRINT #1,"36/216 INCH LINE FEED WHEN GS COMMAND NOT USED";CHR$(10);
90 NEXT I
100 PRINT #1,CHR$(10);
110 REM SET n/144 INCH MODE USING <GS,01>
120 PRINT #1,CHR$(29);CHR$(1);
130 FOR I=1 TO 6
140 PRINT #1,CHR$(27);"3";CHR$(36);
150 PRINT #1,"36/144 INCH LINE FEED";CHR$(10);
160 NEXT I
170 PRINT #1,CHR$(10);
180 REM SET n/216 INCH MODE USING <GS,00>
190 PRINT #1,CHR$(29);CHR$(0);
200 FOR I=1 TO 6
210 PRINT #1,CHR$(27);"3";CHR$(36);
220 PRINT #1,"36/216 INCH LINE FEED";CHR$(10);
230 NEXT I
240 CLOSE
250 END
```

```
36/216 INCH LINE FEED WHEN GS COMMAND NOT USED
36/216 INCH LINE FEED WHEN GS COMMAND NOT USED
36/216 INCH LINE FEED WHEN GS COMMAND NOT USED
36/216 INCH LINE FEED WHEN GS COMMAND NOT USED
36/216 INCH LINE FEED WHEN GS COMMAND NOT USED
36/216 INCH LINE FEED WHEN GS COMMAND NOT USED

36/144 INCH LINE FEED

36/144 INCH LINE FEED

36/144 INCH LINE FEED

36/144 INCH LINE FEED

36/144 INCH LINE FEED

36/144 INCH LINE FEED


36/216 INCH LINE FEED
36/216 INCH LINE FEED
36/216 INCH LINE FEED
```

42. ESC A n **(27, 65, n) Decimal (1B, 41, n) Hex**

$0 \leq n \leq 85$

When $n \geq 86$, this code is ignored.

Standard Mode: This code the linefeed value to n/72 inch.

IBM Mode: This code sets the linefeed value of n/72 inch which will be valid when the ESC 2 command is input. At power-on, n = 12 (1/6 inch) is automatically selected.

```
10 REM SET n/72 INCH PROGRAMMABLE LINE FEED (ESC,A,n)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 FOR I=0 TO 20
50 PRINT #1,CHR$(27);"A";CHR$(I);
60 PRINT #1,SPC(I);I;"/72 INCH LINE FEED";CHR$(10);
70 NEXT I
80 PRINT #1,CHR$(10);
90 PRINT #1,CHR$(27);"2"
100 CLOSE
110 END
```

```
 0 /72 INCH LINE FEED
 1 /72 INCH LINE FEED
 2 /72 INCH LINE FEED
 3 /72 INCH LINE FEED
 4 /72 INCH LINE FEED
 5 /72 INCH LINE FEED
 6 /72 INCH LINE FEED
 7 /72 INCH LINE FEED
 8 /72 INCH LINE FEED
 9 /72 INCH LINE FEED
 10 /72 INCH LINE FEED
 11 /72 INCH LINE FEED
 12 /72 INCH LINE FEED
 13 /72 INCH LINE FEED
 14 /72 INCH LINE FEED
 15 /72 INCH LINE FEED
 16 /72 INCH LINE FEED
 17 /72 INCH LINE FEED
 18 /72 INCH LINE FEED
 19 /72 INCH LINE FEED
 20 /72 INCH LINE FEED
```

43. GS (1) **(29, 1) Decimal (1D, 01) Hex**

This code selects the linefeed value unit of 1/144 inch which will be used with the ESC 3 n, ESC J n, and ESC j n commands.

Refer to 41.

44. GS (0) **(29, 0) Decimal (1D, 00) Hex**

This code selects the linefeed value unit of 1/216 inch which is to be used with the ESC 3 n, ESC J n, and ESC j n commands.

Refer to 41.

• Page Length

Skip-over perforation and vertical tab commands are cleared by these 2 commands.

45. **ESC C n** **(27, 67, n) Decimal (1B, 43, n) Hex**
$1 \leq n \leq 127$

Input of this command designates the page length in line units. n specifies the number of lines per page. The length of a page is determined by multiplying the current linefeed value to n.

The position of the paper, at the time this command is performed, is taken as the top of the form (TOF).

The page length is not altered even if the linefeed value is changed before the end of that page.

If $n \geq 128$ or the page length exceeds 150 inches, the 3 bytes of this command are ignored.

```
10 REM SET PAGE LENGTH IN LINE (ESC,C,n)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM SET PAGE LENGTH OF 5 LINES
50 PRINT #1,CHR$(27);"C";CHR$(5);
60 FOR I=1 TO 2
70 FOR J=1 TO 3
80 PRINT #1,"PAGE ";I;", LINE ";J;CHR$(10);
90 NEXT J
100 PRINT #1,CHR$(12);
110 NEXT I
120 PRINT #1,"PAGE 3"
130 CLOSE
140 END
```

```
PAGE  1 , LINE  1
PAGE  1 , LINE  2
PAGE  1 , LINE  3


PAGE  2 , LINE  1
PAGE  2 , LINE  2
PAGE  2 , LINE  3
```

46. | ESC | C | (0) or (128) | n |

(27, 67, 0 or 128, n) Decimal (1B, 43, 00 or 80, n) Hex

$1 \leq n \leq 22$

Input of this command designates the page length in inch units. n refers to the inch unit. If $n \geq 23$ or $n = 0$, the 4 bytes of this command are ignored.

```
10 REM SET PAGE LENGTH IN INCHES (ESC,C,0,n)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM SET PAGE LENGTH OF 1 INCH
50 PRINT #1,CHR$(27);"C";CHR$(0);CHR$(1);
60 FOR I=1 TO 2
70 FOR J=1 TO 3
80 PRINT #1,"PAGE ";I;", LINE ";J;CHR$(10);
90 NEXT J
100 PRINT #1,CHR$(12);
110 NEXT I
120 PRINT #1,"PAGE 3"
130 CLOSE
140 END
```

```
PAGE  1 , LINE  1
PAGE  1 , LINE  2
PAGE  1 , LINE  3


PAGE  2 , LINE  1
PAGE  2 , LINE  2
PAGE  2 , LINE  3


PAGE 3
```

• Horizontal Tab

47. ESC | D | n1 | n2 | ... | nk | NUL

(27, 68, n1, n2, ..., nk, 0) Decimal (1B, 44, n1, n2, ..., nk, 00) Hex
$1 \leq k \leq 32$ If $k \geq 33$, nk is ignored.

Input of this command designates the horizontal tab. The maximum number of horizontal tab settings is 32. At power-on, the horizontal tab is set at every 8th character column. This command alters these settings. The horizontal tabs are set in ascending order. The setting process ends with a NUL code.

Standard Mode: n is a binary number that is multiplied to the present character width to set the absolute tab positions.

IBM Mode: Tab positions which are relative in this mode are based on the character width in effect when the HT command is used.

```
10 REM HORIZONTAL TAB SETTING (ESC,D,n1...nK,0)
20 REM THE HT COMMAND EXECUTES TAB
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 PRINT #1,CHR$(27);"M";
60 PRINT #1,"01234567891111111111222222222233333333333";CHR$(10);
70 PRINT #1,"          012345678901234567890123456789";CHR$(10);
80 REM SET TAB STOPS AT COLUMNS 5,10,20, AND 29
90 PRINT #1,CHR$(27);"D";CHR$(5);CHR$(10);CHR$(20);
100 PRINT #1,CHR$(29);CHR$(0);
110 FOR I=1 TO 4
120 REM EXECUTE THE TAB
130 PRINT #1;CHR$(9);"TAB";
140 NEXT I
150 PRINT #1,CHR$(10);
160 CLOSE
170 END
```

```
01234567891111111111222222222233333333333
          012345678901234567890123456789
    TAB  TAB       TAB      TAB
```

48. HT **(9) Decimal (09) Hex**

Data input following this command is printed from the next horizontal tab position.

```
10 REM EXECUTION OF TABS VIA HT (ASCII 9)
20 REM TAB DEFAULTS AT EVERY EIGHT COLUMNS
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 PRINT #1,"01234567891111111111222222222233333333333";CHR$(10);
60 PRINT #1,"          012345678901234567890123456789";CHR$(10);
70 FOR I=1 TO 4
80 PRINT #1,CHR$(9);"TAB";
90 NEXT I
100 PRINT #1,CHR$(10);
110 CLOSE
120 END
```

```
01234567891111111111222222222233333333333
        012345678901234567890123456789
      TAB     TAB     TAB     TAB
```

• Margin Setting

49. ESC Q n **(27, 81, n) Decimal (1B, 51, n) Hex**

Input of this command designates the right margin. n specifies the column number according to the present character width. If the value of n exceeds the column number of a single line, the 3 bytes of this command are ignored.

Input of this command clears all print data input prior to this command.

```
10 REM RIGHT MARGIN SETTING (ESC,Q,n)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,"01234567891111111111222222222233333333333";CHR$(10);
50 PRINT #1,"          012345678901234567890123456789";CHR$(10);
60 REM RIGHT MARGIN AT THE 30TH COLUMN
70 PRINT #1,CHR$(10);
80 PRINT #1,"RIGHT MARGIN AT 30TH COLUMN";CHR$(10);
90 PRINT #1,CHR$(27);"Q";CHR$(30);
100 FOR I=1 TO 4:PRINT #1,"0123456789";:NEXT I:PRINT #1,CHR$(10);
110 REM RIGHT MARGIN AT THE 20TH COLUMN
120 PRINT #1,CHR$(10);
130 PRINT #1,"RIGHT MARGIN AT 20TH COLUMN";CHR$(10);
140 PRINT #1,CHR$(27);"Q";CHR$(20);
150 FOR I=1 TO 4:PRINT #1,"0123456789";:NEXT I:PRINT #1,CHR$(10);
160 CLOSE
170 END
```

```
01234567891111111111222222222233333333333
        012345678901234567890123456789

RIGHT MARGIN AT 30TH COLUMN
```

50. ESC ℓ n (27, 108, n) Decimal (1B, 6C, n) Hex

Input of this command designates the left margin. n specifies the column number according to the present character width. If the value of n exceeds the column number of a single line, the 3 bytes of this command are ignored.

If the left margin setting exceeds the right margin setting, this command is ignored. This command is also ignored if the left margin is to be set at a position that exceeds 5.6 inches away from the left end of printable area.

```
10 REM LEFT MARGIN SETTING (ESC,l,n)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,"01234567891111111111222222222233333333333";CHR$(10);
50 PRINT #1,"          012345678901234567890123456789";CHR$(10);
60 REM LEFT MARGIN AT COLUMN 5
70 PRINT #1,CHR$(27);"l";CHR$(5);
80 PRINT #1,"LEFT MARGIN AT COLUMN 5";CHR$(10);
90 REM LEFT MARGIN AT COLUMN 22
100 PRINT #1,CHR$(27);"l";CHR$(22);
110 PRINT #1,"LEFT MARGIN AT COLUMN 22";CHR$(10);
120 CLOSE
130 END
```

```
01234567891111111111222222222233333333333
          012345678901234567890123456789
     LEFT MARGIN AT COLUMN 5
                       LEFT MARGIN AT COLUMN 22
```

51. ESC X n1 n2 (27, 88, n1, n2) Decimal (1B, 58, n1, n2) Hex

The left and right margins are set, respectively, to the n1 and n2 columns in the present character width. This command clears the print data already input.

The following are conditions for which the 4 bytes of this command are ignored.

(i) If n1 and n2 do not conform to: $1 \leq n1 < n2$.
(ii) If the left margin is set at a position beyond 5.6 inches away from the left end of printable area.
(iii) If the right margin exceeds a single line.

```
10 REM SIMULTANEOUS LEFT/RIGHT MARGIN SETTING (ESC,X,n1,n2)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,"012345678911111111112222222222333333333";CHR$(10);
50 PRINT #1,"          01234567890123456789012345678 9";CHR$(10);
60 REM LEFT AND RIGHT MARGINS
70 PRINT #1,CHR$(27);"X";CHR$(10);CHR$(14);
80 PRINT #1,"ABCDEFGHIJKLMNOPQRST";CHR$(10);
90 PRINT #1,CHR$(27);"X";CHR$(15);CHR$(24);
100 PRINT #1,"ABCDEFGHIJKLMNOPQRST";CHR$(10);
110 REM SET LEFT MARGIN BACK TO 0
120 PRINT #1,CHR$(27);"l";CHR$(0);
130 PRINT #1,"LEFT MARGIN BACK TO 0";CHR$(10);
140 CLOSE
150 END
```

```
012345678911111111112222222222333333333
          012345678901234567890123456789
         ABCDE
         FGHIJ
         KLMNO
         PQRST
              ABCDEFGHIJ
              KLMNOPQRST
LEFT MARGIN BACK TO 0
```

• Underlining

52. ESC | - | 1 or (1) **(27, 45, 49 or 1) Decimal (1B, 2D, 31 or 01) Hex**

All characters are underlined, including spaces. Neither graphic data nor the IBM graphic elements such as those in the range of (176)D to (223)D, (244)D, and (245)D are underlined. An underline is not output when the printing position is moved due to a tab.

53. ESC | - | 1 or (0) **(27, 45, 48 or 0) Decimal (1B, 2D, 30 or 00) Hex**

This command terminates underlining.

```
10 REM UNDERLINING (ESC,-,1)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,"This is not underlined";CHR$(10);
50 PRINT #1,CHR$(27);"-";CHR$(1);
60 PRINT #1,"This is underlined";CHR$(10);
70 PRINT #1,CHR$(27);"-";CHR$(0);
80 PRINT #1,"This is not underlined";CHR$(10);
90 CLOSE
100 END
```

```
This is not underlined
This is underlined
This is not underlined
```

• Buffer Clear

54. CAN **(24) Decimal (18) Hex**

This command deletes the print data that has already been input. However, control functions are still valid.

```
10 REM BUFFER CLEAR (CAN -- ASCII 24)
20 REM THIS COMMAND CLEARS ALL PRINT DATA FROM THE BUFFER
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 PRINT #1,CHR$(27);"W";CHR$(1);
60 PRINT #1,"ABCDEFG";
70 REM CLEAR BUFFER
80 PRINT #1,CHR$(24);
90 PRINT #1,"HIJKLMN";CHR$(10);
100 PRINT #1,CHR$(27);"W";CHR$(0)
```

• Back Space

55. BS **(8) Decimal (08) Hex**

After printing the contents of the buffer, the printing initiation position is moved to the left by a single character width, allowing characters to be overlapped. This code is ignored in Proportional Spacing.

```
10 REM BUCKSPACING  (BS -- ASCII 8)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM PRINT SLASHED ZEROS USING BACKSPACING
50 PRINT #1,"00000";
60 FOR I=1 TO 5
70 PRINT #1,CHR$(8);
80 NEXT I
90 PRINT #1,"/////";CHR$(10);
100 CLOSE
110 END
```

```
00000
```

• Home Positioning

56. ESC < **(27, 60) Decimal (1B, 3C) Hex**

This command moves the print head to the home position.

```
10 REM MOVE PRINT HEAD TO HOME POSITION
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 FOR I=1 TO 5
50 PRINT #1,"PRINT - THEN HOME PRINT HEAD"
60 PRINT #1,CHR$(27);"<";
70 NEXT I
80 PRINT #1,CHR$(10);
90 CLOSE
100 END
```

• Skip-over Perforation

57. ESC N n **(27, 78, n) Decimal (1B, 4E, n) Hex**

$1 \leq n \leq 127$

This command sets skip-over perforation linefeed mode.
n is set in line units. A form feed to the top of the next page is automatically performed when the number of remaining lines on the present page is n or less. If skip-over length exceeds the page length or if $n = 0$ or $n \geq 128$, this code is ignored.

58. ESC O **(27, 79) Decimal (1B, 4F) Hex**

This command terminates the skip-over perforation mode.

```
10 REM SKIP PERFORATION
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM SET PAGE LENGTH TO 7 LINE
50 PRINT #1,CHR$(27);"C";CHR$(7);
60 REM PERFORM FF WHEN TWO LINES FROM BOTTOM OF PAGE
70 PRINT #1,CHR$(27);"N";CHR$(2);
80 FOR I=1 TO 17
90 PRINT #1,"LINE ";I;CHR$(10);
100 NEXT I
110 REM CANCEL SKIP PERFORATION OPTION
120 PRINT #1,CHR$(27);"O";
130 CLOSE
140 END
```

```
LINE  1
LINE  2
LINE  3
LINE  4
LINE  5


LINE  6
LINE  7
LINE  8
LINE  9
LINE  10


LINE  11
LINE  12
LINE  13
```

• Reset

59. ESC @ **(27, 64) Decimal (1B, 40) Hex**

This command places the printer in the same state as the power-on state. All data input prior to this command is ignored. Refer to 'APPENDIX B' for further information.

```
10 REM PRINTER RESET (ESC,@)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM SET DOUBLE STRIKE PRINT AND UNDERLINING
50 PRINT #1,CHR$(27);"G";CHR$(27);"-";CHR$(1);
60 PRINT #1,"THIS TEXT IS UNDERLINED AND DOUBLE PRINTED";CHR$(10);
70 REM RESET PRINTER
80 PRINT #1,CHR$(27);"@";
90 PRINT #1,"UNDERLINING AND DOUBLE STRIKE HAVE BEEN RELEASED";CHR$(10);
100 CLOSE
110 END
```

THIS TEXT IS UNDERLINED AND DOUBLE PRINTED
UNDERLINING AND DOUBLE STRIKE HAVE BEEN RELEASED

• Printing Direction

60. | ESC | U | 1 or (1) | **(27, 85, 49 or 1) Decimal (1B, 55, 31 or 01) Hex**

All print data that is input after this command is printed from left to right. This command disables bidirectional printing to achieve greater precision for horizontal dot registration.

61. | ESC | U | 0 or (0) | **(27, 85, 48 or 0) Decimal (1B, 55, 30 or 00) Hex**

This command selects bidirectional printing.

```
10 REM SELECT UNI- OR BI-DIRECTIONAL PRINTING (ESC,U,1/ESC,U,0)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM SET BIDIRECTIONAL PRINTING BY DEFAULT
50 PRINT #1,"<--------------------";CHR$(10);
60 PRINT #1,"-------------------->";CHR$(10);
70 REM SET UNIDIRECTIONAL PRINTING
80 PRINT #1,CHR$(27);"U";CHR$(1);
90 PRINT #1,"-------------------->";CHR$(10);
100 PRINT #1,"-------------------->";CHR$(10);
110 REM SET BIDIRECTIONAL PRINTING ONCE AGAIN
120 PRINT #1,CHR$(27);"U";CHR$(0);
130 PRINT #1,"<--------------------";CHR$(10);
140 PRINT #1,"-------------------->";CHR$(10);
150 CLOSE
160 END
```

```
<--------------------
-------------------->
-------------------->
-------------------->
<--------------------
-------------------->
```

• International Characters

62. ESC R n **(27, 82, n) Decimal (1B, 52, n) Hex**
$0 \leq n \leq 10$ n is binary number.

This command is valid only in Standard mode.

This command selects alternate international characters among 11 different language fonts. If $n > 10$, this command is ignored.

n = 0: USA
n = 1: France
n = 2: Germany
n = 3: England
n = 4: Denmark
n = 5: Sweden
n = 6: Italy
n = 7: Spain
n = 8: Japan
n = 9: Norway
n = 10: Denmark II

```
10 REM INTERNATIONAL CHARACTER SETS (ESC,R,n)
20 REM THIS IS ALSO CONTROLLED BY DIP SWITCH
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 PRINT #1,"SAMPLE USA CHARACTERS";CHR$(10);
60 PRINT #1,"# $ @ [ \ ] ^ ` { | } ~";CHR$(10);CHR$(10);
70 REM SELECT SAMPLE SPANISH CHARACTERS
80 PRINT #1,CHR$(27);"R";CHR$(7);
90 PRINT #1,"SAMPLE SPANISH CHARACTERS";CHR$(10);
100 PRINT #1,"# $ @ [ \ ] ^ ` { | } ~";CHR$(10);CHR$(10);
110 REM SELECT USA CHARACTERS
120 PRINT #1,CHR$(27);"R";CHR$(0);
130 PRINT #1,"SAMPLE USA CHARACTERS";CHR$(10);
140 PRINT #1,"# $ @ [ \ ] ^ ` { | } ~";CHR$(10);
150 CLOSE
160 END
```

```
SAMPLE USA CHARACTERS
# $ @ [ \ ] ^ ` { | } ~

SAMPLE SPANISH CHARACTERS
```

International Characters Designated by ESC, R, n Command

COUNTRY		U.S.A.	FRANCE	GERMANY	ENGLAND	DENMARK	SWEDEN	ITALY	SPAIN	JAPAN	NORWAY	DENMARK II
n		0	1	2	3	4	5	6	7	8	9	10
CODE	(23) Hex (35) Decimal	#	#	#	£	#	#	#	Pt	#	#	#
	(24) H (36) D	$	$	$	$	$	¤	$	$	$	¤	$
	(40) H (64) D	@	à	§	@	@	É	@	@	@	É	É
	(5B) H (91) D	[	°	Ä	[	Æ	Ä	°	¡	[	Æ	Æ
	(5C) H (92) D	\	Ç	Ö	\	Ø	Ö	\	Ñ	¥	Ø	Ø
	(5D) H (93) D	]	§	Ü	]	Å	Å	é	¿	]	Å	Å
	(5E) H (94) D	^	^	^	^	^	Ü	^	^	^	Ü	Ü
	(60) H (96) D	`	`	`	`	`	é	ù	`	`	é	é
	(7B) H (123) D	{	é	ä	{	æ	ä	à	¨	{	æ	æ
	(7C) H (124) D	¦	ù	ö	¦	ø	ö	ò	ñ	¦	ø	ø
	(7D) H (125) D	}	è	ü	}	å	å	è	}	}	å	å
	(7E) H (126) D	~	¨	ß	~	~	ü	ì	~	~	ü	ü

Note: The ESC R n command is valid only in Standard mode in which the Standard Character set is selected.

U.S.A. #$@[\]^`{|}~
FRANCE
ENGLAND £$@[\]^`{|}~
DENMARK
ITALY #$@°\é^`àòèì
SPAIN
NORWAY #¤ÉÆØÅÜéæøåü
DENMARK II

• Tab Initialization

63. [ESC][R] **(27, 82) Decimal (1B, 52) Hex**

This command is valid only in IBM mode.
All vertical and horizontal tab settings are cancelled and replaced with the power-on default settings.

• Deleting Data

64. [DEL] **(127 or 255) Decimal (7F or FF) Hex**

This command is valid only in Standard mode.
The previous character in the buffer is deleted.
This command is ignored in Proportional Spacing.

```
10 REM DELETE  (DEL -- ASCII 127)
20 REM THIS DELETES THE MOST RECENT CHARACTER IN THE BUFFER
30 OPEN "LPT1:" AS #1
40 WIDTH #1,255
50 PRINT #1,"!!!!?";
60 REM DELETE THE QUESTION MARK
70 PRINT #1,CHR$(127);
80 PRINT #1,"!!!!";CHR$(10);
90 CLOSE
100 END


!!!!!!!!
```

• Vertical Tab

65. [ESC][B][n_1][n_2][...][n_k][NUL]

(27, 66, n_1, n_2, ..., n_k, 0) Decimal (1B, 42, n_1, n_2, ..., n_k, 00) Hex
$1 \leq n \leq 255$, $1 \leq k \leq 16$ (Standard mode) or 64 (IBM mode)

This command selects vertical tab positions in channel 0.
n selects the number of lines. The vertical tab is positioned by multiplying the present single linefeed setting by the number of lines (n). The vertical tabs are set in ascending order. The code sequence ends with the [NUL] code. If the order is reversed, this command is terminated. The [VT] command is used to move to vertical tab positions.

66. [ESC][b][m][n1][n2]...[nk][NUL]

(27, 98, m, n1, n2, ..., nk, 0) Decimal (1B, 62, m, n1, n2, ..., nk, 00) Hex
$0 \leq m \leq 7$, $1 \leq n \leq 255$, $1 \leq k \leq 16$

This command is valid only in Standard mode.
This command allows up to 16 vertical tabs to be set in one of the 8 tab channels. There are 8 channels within which vertical tabs can be independently set. m specifies the channel. When m = 0, this command becomes the same as the [ESC][B] command. The method of setting is the same as the [ESC][B] command.
The [ESC][b][m][NUL] command clears all vertical tabs in channel m, so that the [VT] command becomes the [CR] command.

67. [ESC][/][m] **(27, 47, m) Decimal (1B, 2F, m) Hex**
$(0 \leq m \leq 7)$

This command is valid only in Standard mode.
This command selects the vertical tab channel to be used. When m = 0, the vertical tabs set by [ESC][B] are used.
The [VT] command is used to move to vertical tab positions.
Channel 0 (m = 0) is automatically selected at power-on (the default value).

```
10 REM VFU SETTING/SELECTION (ESC,b,m,n1...nK,0/ESC,/,n)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM SET CHANNEL 1 TABS AT 15 AND 35
50 PRINT #1,CHR$(27);"b";CHR$(1);CHR$(15);CHR$(35);CHR$(0);
60 REM SET CHANNEL 2 TABS AT 20 AND 25
70 PRINT #1,CHR$(27);"b";CHR$(2);CHR$(20);CHR$(25);CHR$(0);
80 REM SET CHANNEL 3 TABS AT 20 AND 45
90 PRINT #1,CHR$(27);"b";CHR$(3);CHR$(20);CHR$(45);CHR$(0);
100 FOR I=1 TO 3:READ X
110 PRINT #1,"TOP OF FORM";CHR$(10);
120 PRINT #1,CHR$(27);"/";CHR$(X)
130 PRINT #1,CHR$(11);"TAB 1 FOR CHANNEL ";X
140 PRINT #1,CHR$(11);"TAB 2 FOR CHANNEL ";X
150 PRINT #1,CHR$(12);
160 NEXT I
170 DATA 1,2,3
190 CLOSE
200 END
```

TOP OF FORM	TOP OF FORM	TOP OF FORM
TAB 1 FOR CHANNEL 1	TAB 1 FOR CHANNEL 2	TAB 1 FOR CHANNEL 3
	TAB 2 FOR CHANNEL 2	
TAB 2 FOR CHANNEL 1		TAB 2 FOR CHANNEL 3

• Printer Selection

68. DC3 **(19) Decimal (13) Hex**

This command puts the printer in the deselected state in which the printer ignores all input data except the DC1 code.

69. DC1 **(17) Decimal (11) Hex**

Input of this command terminates the DC3 commmand.

```
10 REM PRINTER SELECT/DESELECT (DC1/DC3)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM SELECT PRINTER IF NOT ALREADY SELECTED
50 PRINT #1,CHR$(17);
60 PRINT #1,"STANDARD PICA - 1";CHR$(10);
70 REM DESELECT THE PRINTER USING DC3
80 PRINT #1,CHR$(19);
90 PRINT #1,CHR$(27);"M";
100 PRINT #1,"ELITE PRINTING";CHR$(10);
110 REM RESELECT THE PRINTER USING DC1
120 PRINT #1,CHR$(17);
130 PRINT #1,"STANDARD PICA - 2";CHR$(10);
140 CLOSE
150 END
```

```
STANDARD PICA - 1
STANDARD PICA - 2
```

• Download Characters (User-defined characters)

Special Draft characters defined by a user are called Download characters.
The commands explained here are valid only in Standard mode. Thus, DIP switch 1-5 must be turned off and DIP switch 1-6 must be turned on before applying power to the printer.
A maximum of 128 download characters can be defined and stored in the RAM area. The contents of the RAM are lost if the power is turned off.
To use the download characters, switch from the default normal character set in the ROM to the download character set in the RAM by inputting the ESC | % | (1) | (0) command.

70. | ESC | % | (0) | (0) | **(27, 37, 0, 0) Decimal (1B, 25, 00, 00) Hex**

This command selects the normal character set stored in the ROM which cannot be modified.
At power-on, this character set is automatically selected.

71. | ESC | % | (1) | (0) | **(27, 37, 1, 0) Decimal (1B, 25, 01, 00) Hex**

This command selects the download character set stored in the RAM which can be accessed.
At power-on, no character is written into the RAM area for the download character set.
The | ESC | & | command is used to write download characters into the RAM area.

72. | ESC | : | (0) | (0) | (0) |

(27, 58, 0, 0, 0) Decimal (1B, 3A, 00, 00, 00) Hex

This command copies the download characters from the ROM characters. Specific characters can then be changed, while leaving the remaining characters unchanged.

73. | ESC | & | (0) | n | m | a | C_0 | C_1 | ... | C_{10} |

(27, 38, 0, n, m, a, C_0, C_1, ..., C_{10}) Decimal
(1B, 26, 00, n, m, a, C_0, C_1, ..., C_{10}) Hex

This command defines download characters whose codes are in the range of (0) Decimal through (127) Decimal.
n is the first download character code to be written and m is the last one. If n is equal to m, only one character is to be written. a (attribute) defines descender and proportional information for the download character to be written.
The following 11 bytes ($C_0 \sim C_{10}$) are the data that actually define the character. Since this command is valid only in Standard mode, be sure DIP switch 1-5 is off and DIP switch 1-6 is on before applying power to the printer. When DIP switch 1-6 is turned off, the RAM area of 1.5 K-bytes is used as communication buffer for input data.

Note: Since international characters are assigned to code (0) Decimal to (31) Decimal and (127) Decimal, as shown in the next page, international characters will be changed accordingly if they are defined as download characters.

International character's code assignment

H / L	0	1	7
0	à	§	
	0	16	112
1	è	ß	
	1	17	113
2	ù	Æ	
	2	18	114
3	ò	æ	
	3	19	115
4	ì	Ø	
	4	20	116
5	°	ø	
	5	21	117
6	£	¨	
	6	22	118
7	¡	Ä	
	7	23	119
8	¿	Ö	
	8	24	120
9	Ñ	Ü	
	9	25	121
A	ñ	ä	
	10	26	122
B	¤	ö	
	11	27	123
C	Pt	ü	
	12	28	124
D	Å	É	
	13	29	125
E	å	é	
	14	30	126
F	ç	¥	Ø
	15	31	127

Example: When England is selected and a given character is defined for the (6) Decimal code, the input of (35) Decimal code will print the defined character instead of "£".

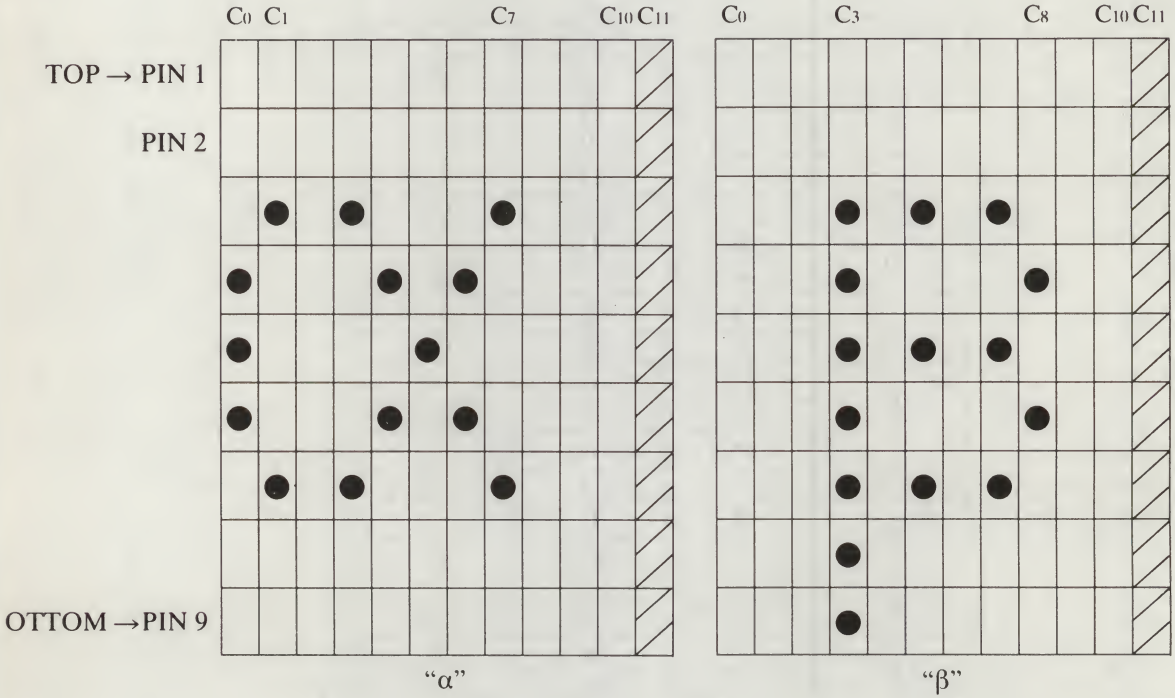
Refer to the International character table shown in the ESC R n command on page 85.

Example of defining characters α" and "β", respectively, for codes (65) Decimal and (66) Decimal.

(1) At power-on, the printer automatically selects the ROM character set regardless of DIP switch 1-6 setting. Therefore, inputting the ESC | % | (1) | (0) command is necessary before using download characters.

(2) Since no download characters are written at power-on, all codes are space codes. Unless you wish to define all download characters by yourself, use the copy command, ESC | : | (0) | (0) | (0) , to make a copy from ROM characters and then use the ESC | & command to define only download characters that should be changed.

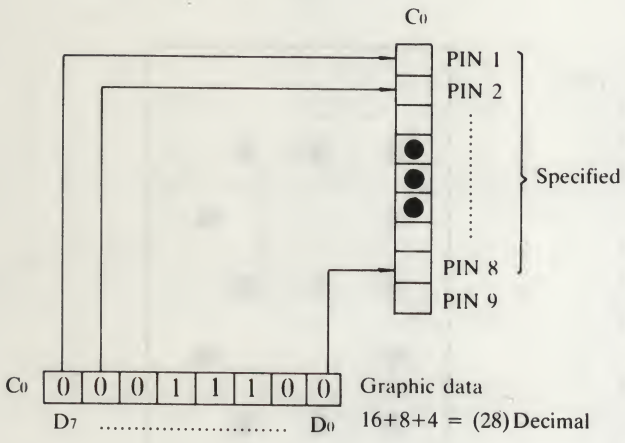
(3) Let us define the following character compositions of "α" and "β".



Note: Horizontally aligned dots are not printed. Refer to the ESC | Y | n1 | n2 command.

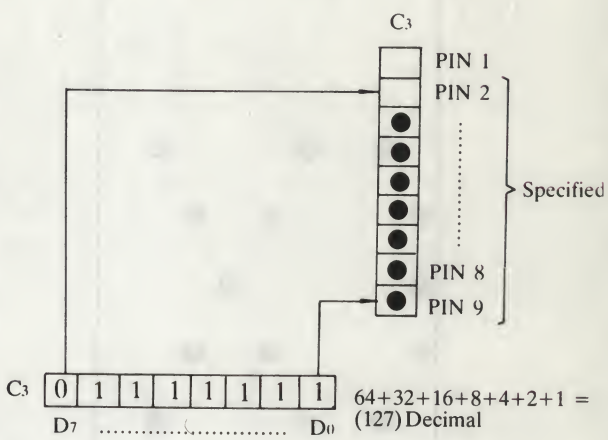
(4) The relationship between PIN 1 to PIN 9 and graphic data is as follows.

"α", C_0 column:



When bit 7 of a (attribute) is 1,
PIN 1 to PIN 8 are specified.

"β", C_3 column:

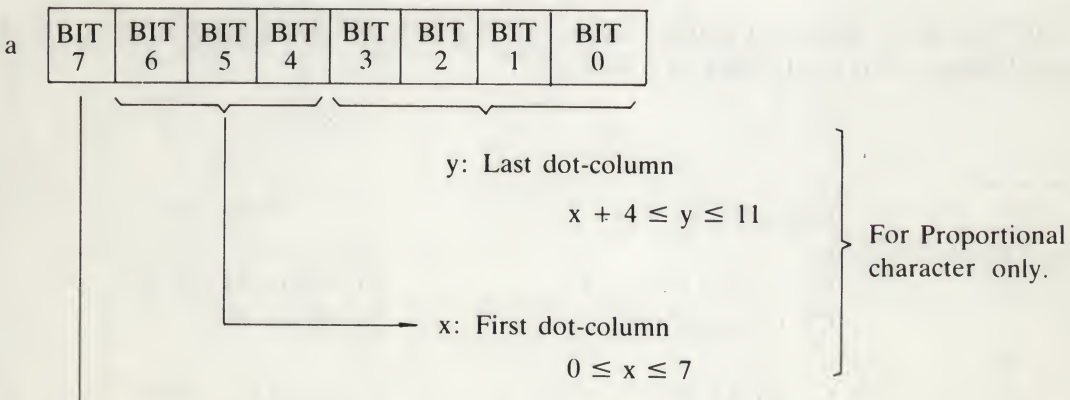


When bit 7 of a (attribute) is 0,
PIN 2 to PIN 9 are specified.

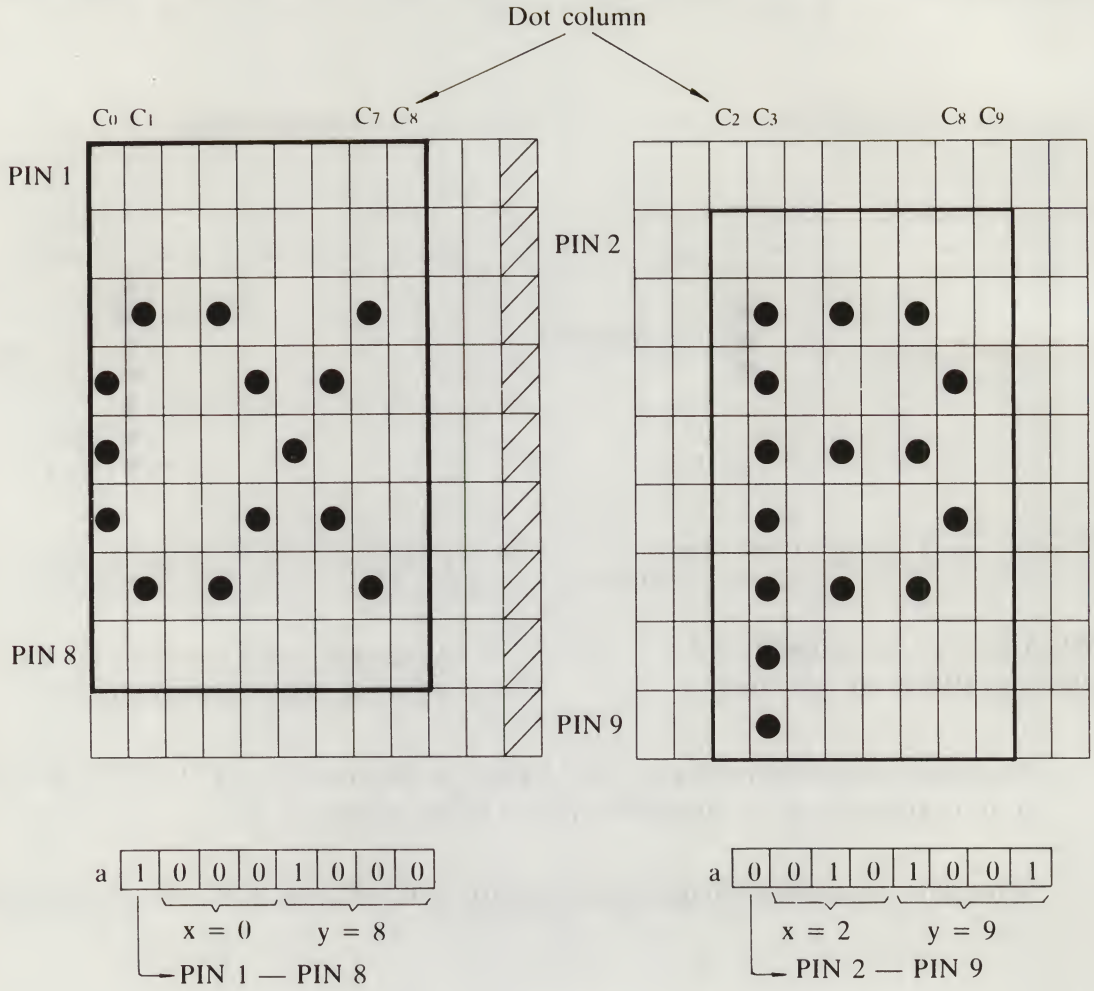
Character composition data for "α", C_0 to C_{10}, are thus (28, 34, 0, 34, 20, 8, 20, 34, 0, 0, 0) Decimal. C_{11} is automatically set in the printer as '0'.

Character composition data for "β" are (0, 0, 0, 127, 84, 0, 84, 40, 0, 0) Decimal

(5) a (attribute) is explained here in detail.



Example:



With the above character compositions, "α" for code (65) Decimal and "β" for code (66) Decimal can be defined as follows.

	ESC, &, 00, n, m	27, 38, 0, 65, 66
"α"	a	136,
	C_0, C_1, C_2, C_3, C_4, C_5,	28, 34, 0, 34, 20, 8
	C_6, C_7, C_8, C_9, C_{10},	20, 34, 0, 0, 0
"β"	a	41,
	C_0, C_1, C_2, C_3, C_4, C_5,	0, 0, 0, 127, 0, 84

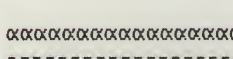
(6) Example 1

```
10 REM DOWNLOAD CHARACTER
20 OPEN "LPT1:" AS#1
30 WIDTH #1,255
40 REM DIP SWITCH 1-6 ON
50 REM SETS PROPORTIONAL
60 PRINT #1,CHR$(27);"p1";
70 PRINT #1,CHR$(27);"&";CHR$(0);
80 PRINT #1,CHR$(65);CHR$(65);
90 PRINT #1,CHR$(136);
100 PRINT #1,CHR$(28);CHR$(34);CHR$(0);CHR$(34);
110 PRINT #1,CHR$(20);CHR$(8);CHR$(20);CHR$(34);
120 PRINT #1,CHR$(0);CHR$(0);CHR$(0);
130 PRINT #1,CHR$(27);"%";CHR$(1);CHR$(0);
140 REM SELECTS THE DOWNLOAD CHARACTER
150 FOR I=1 TO 20
160 PRINT #1,CHR$(65);
170 NEXT I
180 PRINT #1,CHR$(10);
190 REM CLEARS PROPORTIONAL
200 PRINT #1,CHR$(27);"p0";
210 FOR I=1 TO 20
220 PRINT #1,CHR$(65);
230 NEXT I
240 PRINT #1,CHR$(10);
250 PRINT #1,CHR$(27);"%";CHR$(0);CHR$(0);
260 REM SELECTS THE ROM CHARACTER
270 FOR I=1 TO 20
280 PRINT #1,CHR$(65);
290 NEXT I
300 PRINT #1,CHR$(10);
310 CLOSE
320 END
```

```
ααααααααααααααααααααα
αααααααααααααααααααααα
AAAAAAAAAAAAAAAAAAAA
```

(7) Example 2

```
10 REM DOWNLOAD CHARACTER
20 OPEN "LPT1:" AS#1
30 WIDTH #1,255
40 REM DIP SWITCH 1-6 ON
50 REM SETS PROPORTIONAL
60 PRINT #1,CHR$(27);"p1";
70 PRINT #1,CHR$(27);"&";CHR$(0);
80 PRINT #1,CHR$(65);CHR$(66);
90 PRINT #1,CHR$(136);
100 PRINT #1,CHR$(28);CHR$(34);CHR$(0);CHR$(34);
110 PRINT #1,CHR$(20);CHR$(8);CHR$(20);CHR$(34);
120 PRINT #1,CHR$(0);CHR$(0);CHR$(0);
130 PRINT #1,CHR$(41);
140 PRINT #1,CHR$(0);CHR$(0);CHR$(0);CHR$(127);
150 PRINT #1,CHR$(0);CHR$(84);CHR$(0);CHR$(84);
160 PRINT #1,CHR$(40);CHR$(0);CHR$(0);
170 PRINT #1,CHR$(27);"%";CHR$(1);CHR$(0);
180 REM SELECTS THE DOWNLOAD CHARACTER
190 FOR I=1 TO 20
200 PRINT #1,CHR$(65);
210 NEXT I
220 PRINT #1,CHR$(10);
230 FOR I=1 TO 20
240 PRINT #1,CHR$(66);
250 NEXT I
260 PRINT #1,CHR$(10);
270 REM CLEARS PROPORTIONAL
280 PRINT #1,CHR$(27);"p0";
290 FOR I=1 TO 20
300 PRINT #1,CHR$(65);
310 NEXT I
320 PRINT #1,CHR$(10);
330 FOR I=1 TO 20
340 PRINT #1,CHR$(66);
350 NEXT I
360 PRINT #1,CHR$(10);
370 PRINT #1,CHR$(27);"%";CHR$(0);CHR$(0);
380 REM SELECTS THE ROM CHARACTER
390 FOR I=1 TO 20
400 PRINT #1,CHR$(65);
410 NEXT I
420 PRINT #1,CHR$(10);
430 FOR I=1 TO 20
440 PRINT #1,CHR$(66);
450 NEXT I
460 PRINT #1,CHR$(10);
470 CLOSE
480 END
```



• Input Data Control

The following 3 commands are valid only in Standard mode.

74. ESC = (27, 61) Decimal (1B, 3D) Hex

Input of this command causes the 8th bit (MSB) of incoming data to be handled as if it were a '0' in the printer. Some computers always send data with the 8th bit set to 1. Input data cannot be greater than 127 after this command is input.

```
10 REM MSB SET TO 0 (ESC,=)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"=";
50 FOR I=32 TO 80
60 PRINT #1,CHR$(I);
70 NEXT I
80 PRINT #1,CHR$(10);
90 FOR I=160 TO 208
100 PRINT #1,CHR$(I);
110 NEXT I
120 PRINT #1,CHR$(10);
130 CLOSE
140 END
```

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
```

75. ESC > **(27, 62) Decimal (1B, 3E) Hex**

Input of this command causes the 8th bit (MSB) of incoming data to be handled as if it were a '1' in the printer. In most cases this causes text to be printed as italics. Input data cannot be smaller than 128 after this command is input.

```
10 REM MSB SET TO 1 (ESC,>)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);">";
50 FOR I=32 TO 80
60 PRINT #1,CHR$(I);
70 NEXT I
80 PRINT #1,CHR$(10);
90 FOR I=160 TO 208
100 PRINT #1,CHR$(I);
110 NEXT I
120 PRINT #1,CHR$(10);
130 CLOSE
140 END
```

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
```

76. ESC # **(27, 35) Decimal (1B, 23) Hex**

8th bit control set by the ESC = or ESC > command is cleard. At power-on, this mode is selected.

```
10 REM MSB UNDER SOFTWARE CONTROL (ESC,#)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"#";
50 FOR I=32 TO 80
60 PRINT #1,CHR$(I);
70 NEXT I
80 PRINT #1,CHR$(10);
90 FOR I=160 TO 208
100 PRINT #1,CHR$(I);
110 NEXT I
120 PRINT #1,CHR$(10);
130 CLOSE
140 END
```

• Print Code Area Designation

77. ESC 6 (27, 54) Decimal (1B, 36) Hex

i) In Standard mode:

This command allows codes (128) Decimal to (159) Decimal and (255) Decimal to be printed as characters and symbols in italics. Compare the table below with the Standard Character Set Table.

Upper / Lower	8	9	F
0	à	§	
	128	144	240
1	è	ß	
	129	145	241
2	ù	Æ	
	130	146	242
3	ò	æ	
	131	147	243
4	ì	Ø	
	132	148	244
5	°	ø	
	133	149	245
6	£	¨	
	134	150	246
7	¡	Ä	
	135	151	247
8	¿	Ö	
	136	152	248
9	Ñ	Ü	
	137	153	249
A	ñ	ä	
	138	154	250
B	¤	ö	
	139	155	251
C	Pt	ü	
	140	156	252
D	Å	É	
	141	157	253
E	å	é	
	142	158	254
F	ç	¥	Ø
	143	159	255

```
10 REM ITALIC INTERNATIONAL CHARACTERS
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,"ITALIC INTERNATIONAL CHARACTERS";CHR$(10);
50 PRINT #1,CHR$(27);"6";
60 FOR I=128 TO 159
70 PRINT #1,CHR$(I);
80 NEXT I
90 FOR I=240 TO 255
100 PRINT #1,CHR$(I);
110 NEXT I
120 PRINT #1,CHR$(10);
130 CLOSE.
140 END
```

ITALIC INTERNATIONAL CHARACTERS
àèùòì°£¡¿ÑñÇçßÆæĞđ"ÄÖÜäöüéé¥pqrstuvwxyz{|}~0

ii) In IBM Mode:
This command selects the IBM Character Set 2.

```
10 REM CHARACTER SET SELECTION IN IBM MODE
20 OPEN "LPT1:" AS#1
30 WIDTH #1,255
40 GOSUB 200
50 PRINT #1,CHR$(27);"6";
60 GOSUB 200
70 PRINT #1,CHR$(27);"7";
80 GOSUB 200
90 CLOSE
100 END
200 REM SUBROUTINE
210 FOR I=119 TO 134
220 PRINT #1,CHR$(I);
230 NEXT I
240 PRINT #1,CHR$(10);
250 RETURN
```

```
wxyz{|}~
wxyz{|}~Çüéâäàå
```

78. **ESC 7** **(27, 55) Decimal (1B, 37) Hex**

i) In Standard Mode:
This command terminates the ESC 6 command.
After input of this command, codes (128) Decimal to (159) Decimal and (255) Decimal return to control codes.

ii) In IBM Mode:
This command selects the IBM Character Set 1.
Refer to 77.

79. **ESC I 1 or (1)** **(27, 73, 49 or 1) Decimal (1B, 49, 31 or 01) Hex**

Input of this command designates print characters in the range of (0) Decimal to (31) Decimal and (128) Decimal to (159) Decimal excluding the control code as shown in the next page.

```
10 REM PRINTING OF UNDEFINED CODE
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,CHR$(27);"I";CHR$(1);
50 FOR I=0 TO 6
60 PRINT #1,CHR$(I);
70 NEXT I
80 FOR I=16 TO 17
90 PRINT #1,CHR$(I);
100 NEXT I
110 FOR I=21 TO 23
120 PRINT #1,CHR$(I);
130 NEXT I
140 FOR I=28 TO 31
150 PRINT #1,CHR$(I);
160 NEXT I
170 PRINT #1,CHR$(10);
180 PRINT #1,CHR$(27);"I";CHR$(0);
190 CLOSE
200 END
```

```
àèùòì°£§ßø"ÄüéêÑ
```

80. ESC | I | 0 or (0) **(27, 73, 48 or 0) Decimal (1B, 49, 30 or 00) Hex**

Input of this command terminates the ESC | I | 1 command.
This mode is set when power is turned on.

Upper / Lower	0 (8)	1 (9)
0	à	§
	0 (128)	16 (144)
1	è	ß
	1 (129)	17 (145)
2	ù	DC2
	2 (130)	18 (146)
3	ò	DC3
	3 (131)	19 (147)
4	ì	DC4
	4 (132)	20 (148)
5	°	ø
	5 (133)	21 (149)
6	£	¨
	6 (134)	22 (150)
7		Ä
	7 (135)	23 (151)
8	BS	CAN
	8 (136)	24 (152)
9	HT	
	9 (137)	25 (153)
A	LF	ä
	10 (138)	26 (154)
B	VT	ESC
	11 (139)	27 (155)
C	FF	ü
	12 (140)	28 (156)
D	CR	É
	13 (141)	29 (157)
E	SO	é
	14 (142)	30 (158)
F	SI	¥
	15 (143)	31 (159)

Control codes and print characters after ESC | I | 1 is input.

Upper / Lower	0 (8)	1 (9)
0		
	0 (128)	16 (144)
1		DC1
	1 (129)	17 (145)
2		DC2
	2 (130)	18 (146)
3		DC3
	3 (131)	19 (147)
4		DC4
	4 (132)	20 (148)
5		
	5 (133)	21 (149)
6		
	6 (134)	22 (150)
7		
	7 (135)	23 (151)
8	BS	CAN
	8 (136)	24 (152)
9	HT	
	9 (137)	25 (153)
A	LF	
	10 (138)	26 (154)
B	VT	ESC
	11 (139)	27 (155)
C	FF	
	12 (140)	28 (156)
D	CR	GS
	13 (141)	29 (157)
E	SO	
	14 (142)	30 (158)
F	SI	
	15 (143)	31 (159)

Control codes after ESC | I | 0 is input.

Note: Print characters in the range of (128) Decimal to (159) Decimal are printed in

• Immediate Printing

81. | ESC | i | 1 or (1) | **(27, 105, 49 or 1) Decimal (1B, 69, 31 or 01) Hex**

This command designates the immediate print mode in which print data that is already input will be printed if the next data is not input within 0.2 second.

82. | ESC | i | 0 or (0) | **(27, 105, 48 or 0) Decimal (1B, 69, 30 or 00) Hex**

This command terminates the immediate print mode.

```
10 REM IMMEDIATE PRINTING (ESC,i,1)
20 OPEN "LPT1:" AS #1
30 PRINT #1,CHR$(27);"i";CHR$(1);
40 REM SET IMMEDIATE PRINTING FOR 80 CHARACTERS
50 PRINT #1,"HIT ANY COMBINATION OF KEYS TO PRODUCE 25 CHARACTERS";CHR$(10);
60 PRINT #1,"....WATCH HOW EACH CHARACTER IS ECHOED TO THE PRINTER"
70 PRINT #1,CHR$(10);
80 PRINT #1,"--------------------------------------------------"
90 PRINT #1,CHR$(10);
100 FOR I=1 TO 25
110 LET A$=INKEY$
120 IF A$="" THEN 110
130 PRINT #1,A$;
140 NEXT I
150 REM CLEAR IMMEDIATE PRINTING
160 PRINT #1,CHR$(27);"i";CHR$(0);
170 CLOSE
180 END


HIT ANY COMBINATION OF KEYS TO PRODUCE 25 CHARACTERS

....WATCH HOW EACH CHARACTER IS ECHOED TO THE PRINTER

--------------------------------------------------

ABCDEFGHIJKLMNOPQRSTUVWXY
```

• CR Code Control

These 2 commands are valid only in IBM Mode.

83. | **ESC** | **5** | **1 or (1)** | **(27, 53, 49 or 1) Decimal (1B, 35, 31 or 01) Hex**

The | CR | code performs a carriage return and linefeed regardless of the $\overline{\text{AUTO FEED}}$ signal and DIP switch 1-7 selection.

84. | **ESC** | **5** | **0 or (0)** | **(27, 53, 48 or 0) Decimal (1B, 35, 30 or 00) Hex**

The | CR | code performs a carriage return without linefeed regardless of the $\overline{\text{AUTO FEED}}$ signal and DIP switch 1-7 selection.

```
10 REM CR CODE CONTROL
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 REM CARRIAGE RETURN AND LINEFEED
50 PRINT #1,CHR$(27);"5";CHR$(1);
60 PRINT #1,"ABCDEF";CHR$(13);
70 PRINT #1,"      GHIJKL";
80 PRINT #1,CHR$(10);CHR$(10);
90 REM CARRIAGE RETURN ONLY
100 PRINT #1,CHR$(27);"5";CHR$(0);
110 PRINT #1,"ABCDEF";CHR$(13);
120 PRINT #1,"      GHIJKL";CHR$(10);
130 CLOSE
140 END
```

```
ABCDEF
      GHIJKL

ABCDEFGHIJKL
```

• Print Position Control

85. ESC SP n **(27, 32, n) Decimal (1B, 20 n) Hex**

$0 \leq n \leq 127$

The space between characters is increased by n dot columns in the dot pitch units of the current print mode. Each dot pitch is shown below.

Print Mode		Dot pitch
Draft	Pica 10 cpi	n/120″
	Elite 12 cpi	n/144″
	Condensed 17 cpi	n/240″
NLQ	Pica 10 cpi	n/240″
	Elite 12 cpi	n/288″

```
10 REM PRINT POSITION CONTROL
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,"ABCDE";
50 PRINT #1,CHR$(27);" ";CHR$(120);
60 PRINT #1,"FGHI";
70 PRINT #1,CHR$(27);" ";CHR$(0);
80 PRINT #1,"JKLMN";CHR$(10);
90 REM SET CONDENSED CHARACTER
100 PRINT #1,CHR$(15);
110 PRINT #1,"ABCDE";
120 PRINT #1,CHR$(27);" ";CHR$(120);
130 PRINT #1,"FGHI";
140 PRINT #1,CHR$(27);" ";CHR$(0);
150 PRINT #1,"JKLMN";CHR$(10);
160 REM CLEAR CONDENSED
170 PRINT #1,CHR$(18);
180 CLOSE
190 END
```

```
ABCDEF          G          H          IJKLMN
ABCDEF      G       H       IJKLMN
```

86. ESC | $ | n1 | n2 (27, 36, n1, n2) Decimal (1B, 24, n1, n2) Hex

This command moves the print head to an absolute dot position. The dot position is calculated by (256 × n2 + n1) × 1/60 inch.
This command is ignored if the calculated dot position exceeds the right margin.

```
10 REM MOVE PRINTHEAD TO AN ABSOLUTE DOT POSITION (ESC,$,n1,n2)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,"MOVE";
50 PRINT #1,CHR$(27);"$";CHR$(60);CHR$(0);
60 PRINT #1,"TO ONE INCH FROM LEFT COLUMN";CHR$(10);
70 PRINT #1,CHR$(15);
80 PRINT #1,"MOVE";
90 PRINT #1,CHR$(27);"$";CHR$(60);CHR$(0);
100 PRINT #1,"TO ONE INCH FROM LEFT COLUMN AGAIN";CHR$(10);
110 PRINT #1,CHR$(18);
120 CLOSE
130 END
```

```
MOVE        TO ONE INCH FROM LEFT COLUMN
MOVE        TO ONE INCH FROM LEFT COLUMN AGAIN
```

87. ESC | \ | n1 | n2 (27, 92, n1, n2) Decimal (1B, 5C, n1, n2) Hex

The print head can be moved to a dot position relative to the present position. The dot pitch is the same as the ESC | SP | n command.
The amount of movement to the right in dot units is calculated by (256 × n2 + n1).
This command is ignored if the calculated dot position is outside the current left and right margins.

```
10 REM MOVE PRINTHEAD TO A RELATIVE DOT POSITION (ESC,\,n1,n2)
20 OPEN "LPT1:" AS #1
30 WIDTH #1,255
40 PRINT #1,"MOVE";
50 PRINT #1,CHR$(27);"\";CHR$(60);CHR$(0);
60 PRINT #1,"60 DOT POSITIONS TO THE RIGHT";CHR$(10);
70 PRINT #1,CHR$(15);
80 PRINT #1,"MOVE";
90 PRINT #1,CHR$(27);"\";CHR$(60);CHR$(0);
100 PRINT #1,"60 DOT POSITIONS TO THE RIGHT AGAIN";CHR$(10);
110 PRINT #1,CHR$(18);
120 CLOSE
130 END
```

TROUBLESHOOTING

Use the table below to diagnose any problems that may occur. If you cannot solve the problem, try to decide what part of your system is not working properly and consult your dealer.

PROBLEM	CAUSE AND REMEDY
The printer does not print. The POWER lamp does not light.	1) Power is not getting to the printer. • Check the power cord and power switch.
The printer does not print. The POWER lamp is lit.	1) The connection to the computer is not correct. • Check that the cable connecting the printer and computer is correctly connected.
The printer is operating properly, but the paper is not feeding through properly.	1) The paper is jammed in the printer. • Remove the paper and reinsert it properly.
The print is light or smeared.	1) The print head position is not correct. • Move the head adjustment lever to match the paper being used. 2) The ribbon cassette is not properly installed. • Properly install the cassette. 3) The ink ribbon is old or is worn out. • Replace the old ribbon cassette with a new one.
The POWER lamp is blinking.	1) An error condition has been detected. • Turn power off and then back on again.

APPENDIX A GLOSSARY

ASCII

American Standard Code for Information Interchange.
This code consists of binary numbers and decimal numbers that represent characters and control codes.

Example:

ASCII Character	Hex	Decimal
A	41	65
B	42	66
C	43	67
0 (Zero)	30	48
2	32	50
4	34	52

baud rate

A measure of the data transmission speed.
One baud is equivalent to one bit per second.

BASIC

Beginner's All-Purpose Symbolic Instruction Code.
A high level programming language designed for ease of use. It is now a standard programming language for microcomputers.

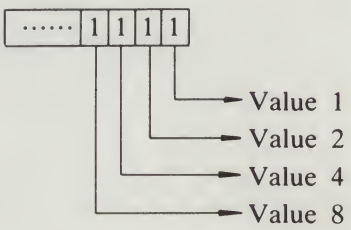
bidirectional printing

The printing direction of consecutive lines is alternated to speed up the printing.

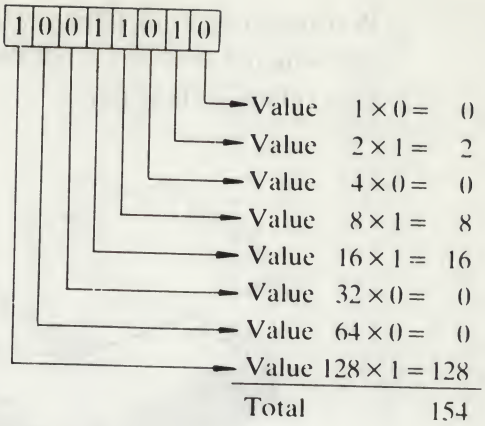
binary

A base 2 number system using only the digits zero (0) and one (1). The right most digit of a binary number has a value of 1, the next a value of 2, then 4, 8, and so on.

Binary number:

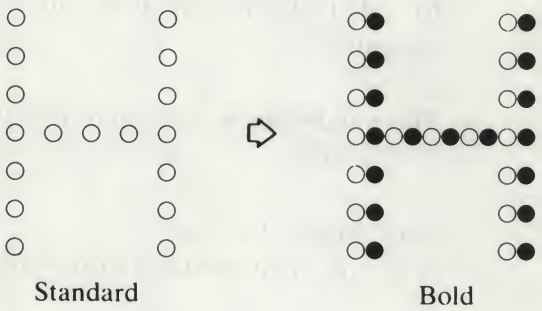


Example:



bit An abbreviation for a binary digit.
Each bit is either zero or one.

bold characters Characters which appear darker than normal to give emphasis. Each dot of a character is printed again slightly to the right of the initial dot.



buffer Storage memory which keeps input data temporarily until it can be printed.

byte One byte consists of 8 bits.

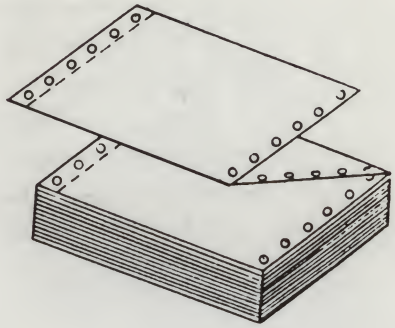
carriage return The control character that makes a printer start a new line.

character Any symbol that represents a digit, letter, or other symbol.

commands Orders used to tell the printer to perform something.

condensed Printing in which each character is narrower than Pica or Elite

continuous forms Perforated fonfold paper with sprocket holes along both sides, allowing the tractor to pull the paper through the printer. This is also called fanfold paper.



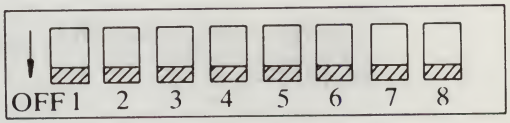
CPI Characters Per Inch

CPS Characters Per Second

data Encoded information that can be processed or produced by a computer.

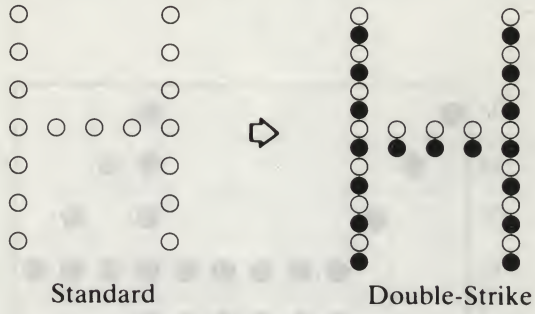
decimal The numbering system that uses the numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.

DIP switch Dual In-line Package.
A set of small switches inside the printer.



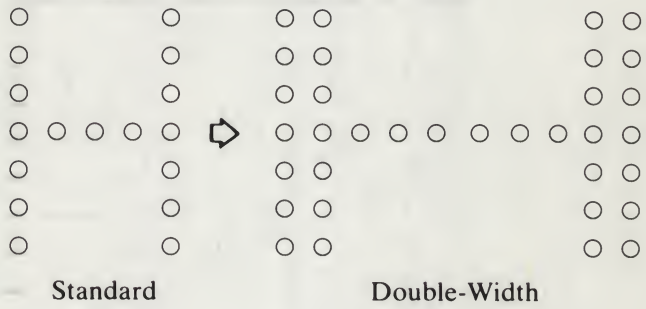
double-strike printing

Characters are printed twice for greater intensity. In the second pass, the dots are printed sightly below the initial dots.



double-width

A feature that allows standard characters to be printed double their width: 10 CPI (Pica) becomes 5 CPI.



elite

A term used to describe 12 cpi printing.

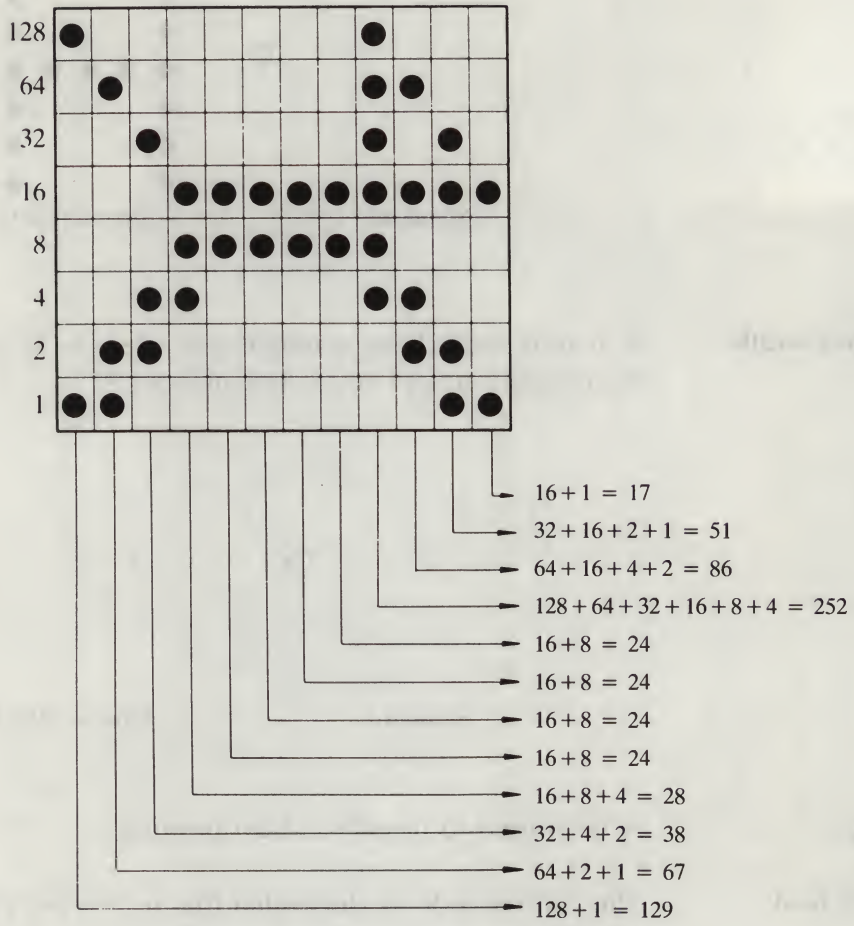
form feed

The control code or the switch that moves the paper up to the top the next page.

friction feed

Advancing paper by using pressure (friction) on the paper to pull it through the printer.

graphics printing Information printed as charts, pictures or drawings which are composed of dots.



hex or hexadecimal

A numbering system that uses 16 as its base.
Letters A to F are, respectively, representing numbers 10 to 15 respectively.

Example:

Hexadecimal	Decimal	Binary
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
A	10	1010
B	11	1011
C	12	1100
D	13	1101
E	14	1110
F	15	1111

input

Information received by the computer or the printer from outside.

interface

A connection which provides communication between the computer and the printer.
Parallel and serial interfaces are the 2 basic connections.

line feed

The control character or the switch that moves the paper forward by one line.

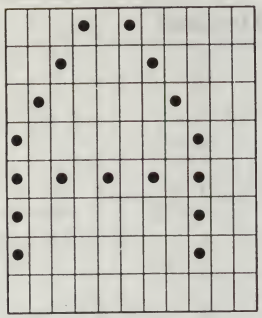
LSB

Least Significant Bit.
The farthest right digit in a binary number.
1 byte: 1 0 1 0 0 1 0 1
LSB

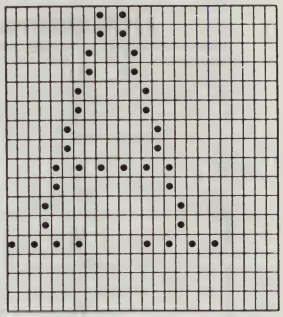
MSB

Most Significant Bit.
The farthest left digit in a binary number.
1 byte: 1 0 0 1 0 1 0 1

NLQ Near Letter Quality.
A style of printing that allows much greater definition than standard quality.



Standard



NLQ

off-line Not having direct interaction with computer. In the off-line mode, the printer cannot receive any data from the computer.

on-line When the printer is in on-line mode, the connected computer can transmit data to the printer.

output Information printed out on paper by the printer or transmitted by the computer to the printer.

parallel interface A data transmission connection which has a separate wire for each of the data bits. Therefore, 8 bits (1 byte) can be transmitted simultaneously.

pica A term used to describe 10 cpi printing.

pin feed A system which moves paper through the printer using pins. They engage in holes along the edges of the paper.

proportional printing Printing in which wide characters like 'W' and 'M' are given more space than narrow ones like 'i'.

```
STANDARD     : Proportionally
PROPORTIONAL : Proportionally
```

RAM — Random Access Memory
This temporary memory is random because it provides immediate access to any storage location in the memory. Data may be written in or read out while the power is supplied. Data stored will be lost once the power is turned off.

ROM — Read Only Memory
A memory where data is stored permanently or semi-permanently and can be read out, but not altered while in regular use.

tab — Commands the printer to start printing at a certain location. There are 2 such commands: horizontal tab and vertical tab.

TOF — Top of Form
The location on a page where the first line of printing will appear.

unidirectional printing — All printing is performed from left to right.

APPENDIX B DEFAULT SETTINGS

Printer initialization is accomplished in one of the following 3 ways.

1. The power switch is turned off and then back on again.
2. The $\overline{\text{INITIAL}}$ signal is sent to pin 31 of a Parallel Interface.
3. The [ESC][@] command is input.

The following default settings are automatically selected each time initialization takes place.

Item	Default settings		
	1. Power-on	2. $\overline{\text{INITIAL}}$ signal	3. [ESC][@] command
Interface reset and $\overline{\text{ACK}}$ output	Performed		Unperformed
DIP switch reading	Performed		Unperformed
Self test function	Performed		Unperformed
Print head position	Home position		
Print data	Cleared		
Margin setting	Cleared		
Horizontal tab	Every 8th column		
Vertical tab	Cleared. Channel 0 is selected		
Linefeed pitch	1/6″		
Character mode	Draft, 10 CPI		10 CPI, Draft or NLQ previously designated by the switch.
TOF	Present position		
Download area	Cleared		
Page length	11″ or 12″, selected by DIP switch 1-4		Returns to the selection at power-on.
International characters	Selected by DIP switch 1-1 to 1-3		Returns to the selection at power-on.
Linefeed pitch for [ESC][3][n], [ESC][J][n], and [ESC][j][n]	n/216″		

APPENDIX C
CHARACTER CATEGORY PRIORITY TABLE

CHARACTER CATEGORY PRIORITY TABLE

* In print mode the following priorities exist.

1. Elite > Proportional > Bold > Condensed > Pica
2. Superscript/Subscript > NLQ > Double Strike

Examples:

a. If the Elite, Condensed, Superscript, and Double Strike modes are designated, according to Priority chart No. 84, Elite Superscript characters will be printed.

b. If the Elite mode is terminated from the above example, Condensed Superscript characters will be printed according to No. 20.

c. If the Superscirpt mode is terminated from example a., Elite Double Strike characters will be printed according to No. 83.

Prop: Proportional Cond: Condensed D.S.: Double Strike Sup/Sub: Superscript/Subscript

	Command Combination							Character Mode Printed								Printed Ex.
No.	Elite	Prop.	Cond.	Bold	NLQ	D.S.	Sup/Sub	Pica	Elite	Prop.	Cond.	Bold	NLQ	D.S.	Sup/Sub	A B C h i j k
1								○								ABChijk
2							○	○							○	ABChijk
3						○		○						○		ABChijk
4						○	○	○							○	ABChijk
5					○			○					○			ABChijk
6					○		○	○							○	ABChijk
7					○	○		○					○			ABChijk
8					○	○	○	○							○	ABChijk
9				○				○				○				ABChijk
10				○			○	○				○			○	ABChijk
11				○		○		○				○		○		ABChijk
12				○		○	○	○				○			○	ABChijk
13				○	○			○				○	○			ABChijk
14				○	○		○	○				○			○	ABChijk
15				○	○	○		○				○	○			ABChijk
16				○	○	○	○	○				○			○	ABChijk
17			○								○					ABChijk
18			○				○				○				○	ABChijk
19			○			○					○			○		ABChijk
20			○			○	○				○				○	ABChijk
21			○		○						○					ABChijk
22			○		○		○				○				○	ABChijk
23			○		○	○					○			○		ABChijk
24			○		○	○	○				○				○	ABChijk
25			○	○				○				○				ABChijk
26			○	○			○	○				○			○	ABChijk
27			○	○		○		○				○		○		ABChijk
28			○	○		○	○	○				○			○	ABChijk
29			○	○	○			○				○				ABChijk
30			○	○	○		○	○				○			○	ABChijk
31			○	○	○	○		○				○		○		ABChijk
32			○	○	○	○	○	○				○			○	ABChijk
33		○								○						ABChijk
34		○					○			○					○	ABChijk

Prop: Proportional Cond: Condensed D.S.: Double Strike Sup/Sub: Superscript/Subscript

	Command Combination							Character Mode Printed								Printed Ex.
No.	Elite	Prop.	Cond.	Bold	NLQ	D.S.	Sup/Sub	Pica	Elite	Prop.	Cond.	Bold	NLQ	D.S.	Sup/Sub	A B C h i j k
35		○				○				○				○		ABChijk
36		○				○	○			○					○	ABChijk
37		○			○					○			○			ABChijk
38		○			○		○			○					○	ABChijk
39		○			○	○				○			○			ABChijk
40		○			○	○	○			○					○	ABChijk
41		○		○						○		○				ABChijk
42		○		○			○			○		○			○	ABChijk
43		○		○		○				○		○		○		ABChijk
44		○		○		○	○			○		○			○	ABChijk
45		○		○	○					○		○	○			ABChijk
46		○		○	○		○			○		○			○	ABChijk
47		○		○	○	○				○		○	○			ABChijk
48		○		○	○	○	○			○		○			○	ABChijk
49		○	○							○						ABChijk
50		○	○				○			○					○	ABChijk
51		○	○			○				○				○		ABChijk
52		○	○			○	○			○					○	ABChijk
53		○	○		○					○			○			ABChijk
54		○	○		○		○			○					○	ABChijk
55		○	○		○	○				○			○			ABChijk
56		○	○		○	○	○			○					○	ABChijk
57		○	○	○						○		○				ABChijk
58		○	○	○			○			○		○			○	ABChijk
59		○	○	○		○				○		○		○		ABChijk
60		○	○	○		○	○			○		○			○	ABChijk
61		○	○	○	○					○		○	○			ABChijk
62		○	○	○	○		○			○		○			○	ABChijk
63		○	○	○	○	○				○		○	○			ABChijk
64		○	○	○	○	○	○			○		○			○	ABChijk
65	○								○							ABChijk
66	○						○		○						○	ABChijk
67	○					○			○					○		ABChijk
68	○					○	○		○						○	ABChijk

Prop: Proportional Cond: Condensed D.S.: Double Strike Sup/Sub: Superscript/Subscript

	Command Combination							Character Mode Printed								Printed Ex.
No.	Elite	Prop.	Cond.	Bold	NLQ	D.S.	Sup/Sub	Pica	Elite	Prop.	Cond.	Bold	NLQ	D.S.	Sup/Sub	A B C h i j k
69	○				○				○				○			ABChijk
70	○				○		○		○						○	ABChijk
71	○				○	○			○				○			ABChijk
72	○				○	○	○		○						○	ABChijk
73	○			○					○			○				ABChijk
74	○			○			○		○			○			○	ABChijk
75	○			○		○			○			○		○		ABChijk
76	○			○		○	○		○			○			○	ABChijk
77	○			○	○				○			○	○			ABChijk
78	○			○	○		○		○			○			○	ABChijk
79	○			○	○	○			○			○	○			ABChijk
80	○			○	○	○	○		○			○			○	ABChijk
81	○		○						○							ABChijk
82	○		○				○		○						○	ABChijk
83	○		○			○			○					○		ABChijk
84	○		○			○	○		○						○	ABChijk
85	○		○		○				○				○			ABChijk
86	○		○		○		○		○						○	ABChijk
87	○		○		○	○			○				○			ABChijk
88	○		○		○	○	○		○						○	ABChijk
89	○		○	○					○			○				ABChijk
90	○		○	○			○		○			○			○	ABChijk
91	○		○	○		○			○			○		○		ABChijk
92	○		○	○		○	○		○			○			○	ABChijk
93	○		○	○	○				○			○	○			ABChijk
94	○		○	○	○		○		○			○			○	ABChijk
95	○		○	○	○	○			○			○	○			ABChijk
96	○		○	○	○	○	○		○			○			○	ABChijk
97	○	○							○							ABChijk
98	○	○					○		○						○	ABChijk
99	○	○				○			○					○		ABChijk
100	○	○				○	○		○						○	ABChijk
101	○	○			○				○				○			ABChijk
102	○	○			○		○		○						○	ABChijk

Prop: Proportional Cond: Condensed D.S.: Double Strike Sup/Sub: Superscript/Subscript

	Command Combination							Character Mode Printed								Printed Ex.
No.	Elite	Prop.	Cond.	Bold	NLQ	D.S.	Sup/Sub	Pica	Elite	Prop.	Cond.	Bold	NLQ	D.S.	Sup/Sub	A B C h i j k
103	○	○			○	○			○				○			ABChijk
104	○	○			○	○	○		○						○	ABChijk
105	○	○		○					○			○				ABChijk
106	○	○		○			○		○			○			○	ABChijk
107	○	○		○		○			○			○		○		ABChijk
108	○	○		○		○	○		○			○			○	ABChijk
109	○	○		○	○				○			○	○			ABChijk
110	○	○		○	○		○		○			○			○	ABChijk
111	○	○		○	○	○			○			○	○			ABChijk
112	○	○		○	○	○	○		○			○			○	ABChijk
113	○	○	○						○							ABChijk
114	○	○	○				○		○						○	ABChijk
115	○	○	○			○			○					○		ABChijk
116	○	○	○			○	○		○						○	ABChijk
117	○	○	○		○				○				○			ABChijk
118	○	○	○		○		○		○						○	ABChijk
119	○	○	○		○	○			○				○			ABChijk
120	○	○	○		○	○	○		○						○	ABChijk
121	○	○	○	○					○			○				ABChijk
122	○	○	○	○			○		○			○			○	ABChijk
123	○	○	○	○		○			○			○		○		ABChijk
124	○	○	○	○		○	○		○			○			○	ABChijk
125	○	○	○	○	○				○			○	○			ABChijk
126	○	○	○	○	○		○		○			○			○	ABChijk
127	○	○	○	○	○	○			○			○	○			ABChijk
128	○	○	○	○	○	○	○		○			○			○	ABChijk

APPENDIX D PARALLEL INTERFACE

1. Input Connector

Signal Diagram

PIN	SIGNAL	IN/OUT	PIN	SIGNAL	IN/OUT
1	$\overline{\text{STROBE}}$	IN	19	GND	
2	DATA 1	IN	20	GND	
3	DATA 2	IN	21	GND	
4	DATA 3	IN	22	GND	
5	DATA 4	IN	23	GND	
6	DATA 5	IN	24	GND	
7	DATA 6	IN	25	GND	
8	DATA 7	IN	26	GND	
9	DATA 8	IN	27	GND	
10	$\overline{\text{ACK}}$	OUT	28	GND	
11	BUSY	OUT	29	GND	
12	LOW	OUT	30	GND	
13	HIGH		31	$\overline{\text{INITIAL}}$	IN
14	$\overline{\text{AUTO FEED}}$	IN	32	$\overline{\text{ERROR}}$	OUT
15	NC		33	GND	
16	GND		34	NC	
17	CHASSIS GND		35	HIGH	
18	NC		36	NC	

Note 1: High is connected through a 2.2 kΩ pull-up resistor to +5V.
Note 2: NC stands for lines Not Connected.

2. Signal Explanations

(a) Input signals to the printer.

* DATA 1 – DATA 8
  8-bit data signal, with "1" being HIGH. DATA 1 is LSB and DATA 8 is MSB.

* $\overline{\text{STROBE}}$
  Strobe signal used to read 8 bits of data. Data is input when the signal is LOW.

* $\overline{\text{INITIAL}}$
  Puts the printer into its initial state. It is usually HIGH. When it goes LOW and then HIGH again, the printer is initialized.

* $\overline{\text{AUTOFEED}}$
  When DIP switch 1-7 is off, bringing this signal LOW adds a linefeed execution to the CR code.
  When DIP switch 1-7 is on, the CR code always performs a carriage return and line feed. This signal is connected to DIP switch 1-7 within the printer. The ESC 5 command overrides this signal to control the CR code execution.

(b) Signals from the printer

* BUSY
  This signal shows that the printer is in the BUSY state. When it is HIGH, data cannot be received. The following are conditions for which a HIGH BUSY signal is output.
  1) While performing initialization operations.
  2) While the printer is inputting data with the $\overline{\text{STROBE}}$ signal.
  3) During the self-test.
  4) When the printer is in the OFF-LINE state.
     - By pressing the Front panel switch to enter the OFF-LINE state.
     - An error is detected (The POWER Lamp is blinking).

* $\overline{\text{ACK}}$
  When the BUSY state has been entered due to the above reasons except for 4) and 5), this signal, which is synchronized with the falling edge of the BUSY signal, is output.

* $\overline{\text{ERROR}}$

This signal goes LOW to show that the printer is in the error state.
The following conditions will cause errors.

(1) If an internal RAM error is detected during the initialization operations.
(2) If the home position is not detected during the home detection process.

When the POWER lamp is blinking due to an ERROR state caused by (1) or (2), turn the switch off and then on again, or input the $\overline{\text{INITIAL}}$ signal in order to terminate the error state.

3. Electrical Conditions

(a) Signal levels

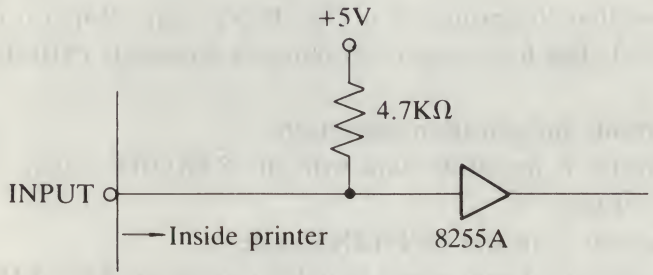
All signals are TTL level.

High level	+2.4V ~ 5.0V	Measured at the input
Low level	0V ~ 0.4V	pins on the printer.

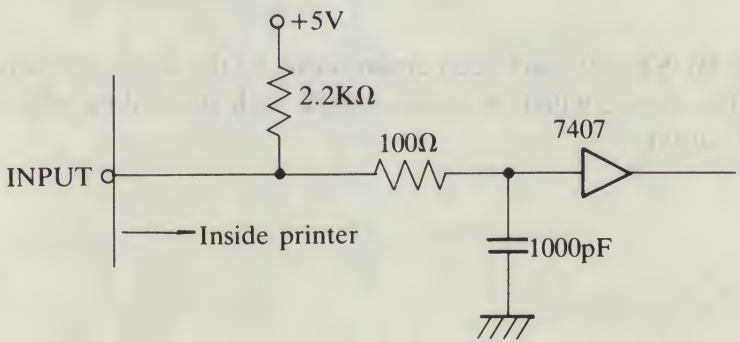
(b) Input/output conditions

1) Input signals

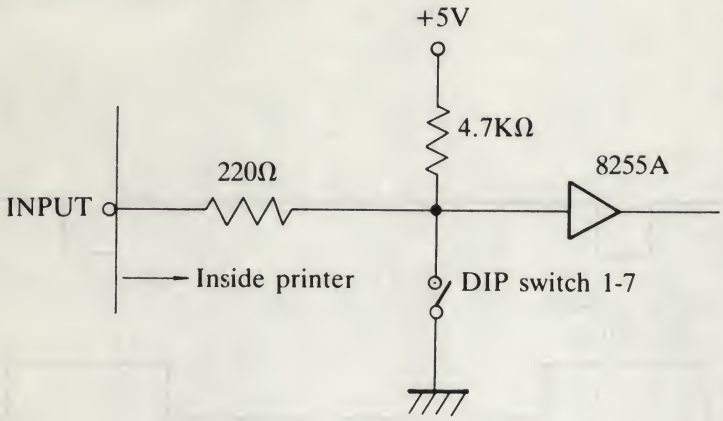
- DATA 1 ~ DATA 8



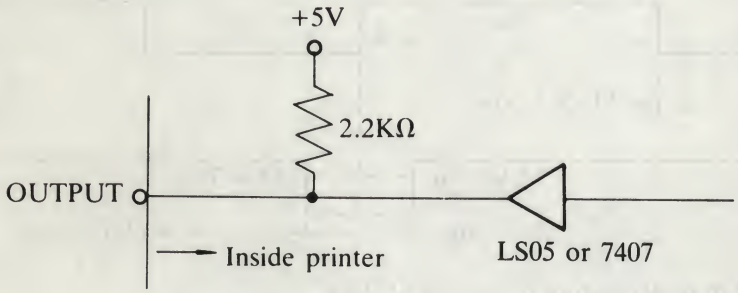
- $\overline{\text{INITIAL}}$ and $\overline{\text{STROBE}}$ signals



- $\overline{\text{AUTO FEED}}$ signal



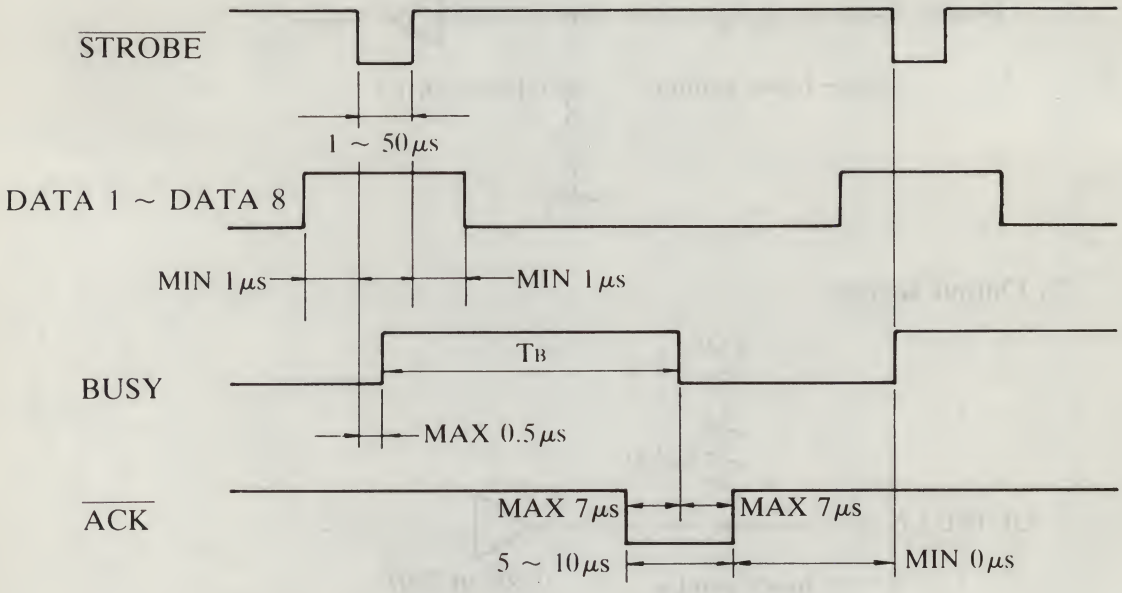
2) Output signals



3) Signal cable length
The maximum length is 2 meters and all the signal lines should be run as twisted pairs with the GND lines.

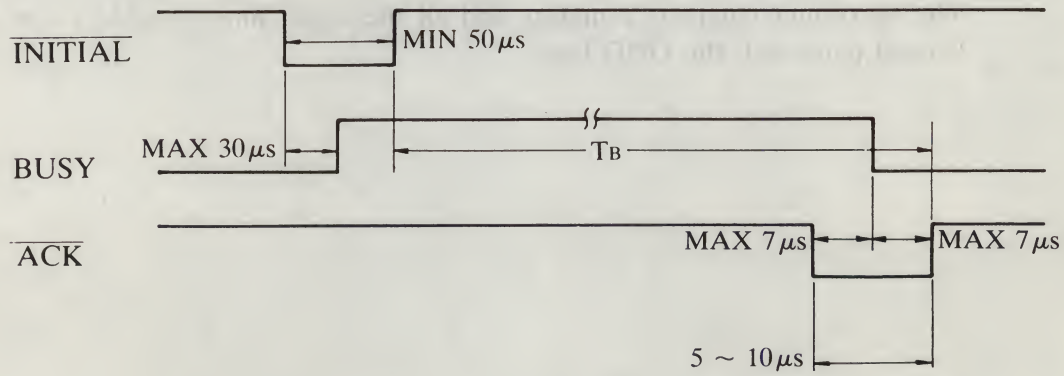
4. Timing Chart

(a) Data input



TB: differs depending on the input data.

(b) Initialization



TB: 5ms

APPENDIX E CHARACTER SET TABLE

STANDARD CHARACTER SET (IN STANDARD MODE)

Upper Bit / Lower Bit	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex.	Binary	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL		SP	0	@	P	`	p			SP	0	@	P	`	p
		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
1	0001		DC1	!	1	A	Q	a	q		DC1	!	1	A	Q	a	q
		1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
2	0010		DC2	"	2	B	R	b	r		DC2	"	2	B	R	b	r
		2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
3	0011		DC3	#	3	C	S	c	s		DC3	#	3	C	S	c	s
		3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
4	0100		DC4	$	4	D	T	d	t		DC4	$	4	D	T	d	t
		4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
5	0101			%	5	E	U	e	u			%	5	E	U	e	u
		5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	0110			&	6	F	V	f	v			&	6	F	V	f	v
		6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	0111			'	7	G	W	g	w			'	7	G	W	g	w
		7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	1000	BS	CAN	(	8	H	X	h	x	BS	CAN	(	8	H	X	h	x
		8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
9	1001	HT		)	9	I	Y	i	y	HT		)	9	I	Y	i	y
		9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
A	1010	LF		*	:	J	Z	j	z	LF		*	:	J	Z	j	z
		10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
B	1011	VT	ESC	+	;	K	[	k	{	VT	ESC	+	;	K	[	k	{
		11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
C	1100	FF		,	<	L	\	l	¦	FF		,	<	L	\	l	
		12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
D	1101	CR	GS	-	=	M	]	m	}	CR	GS	-	=	M	]	m	}
		13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
E	1110	SO		.	>	N	^	n	~	SO		.	>	N	^	n	~
		14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
F	1111	SI		/	?	O	_	o	DEL	SI		/	?	O	_	o	DEL
		15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWX
YZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
```

IBM CHARACTER SET 1 (IN IBM MODE)

Upper Bit / Lower Bit	Hex:	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex.	Binary	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL		SP	0	@	P	`	p			á	▒	└	╨	α	≡
		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
1	0001		DC1	!	1	A	Q	a	q		DC1	í	▒	┴	╤	β	±
		1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
2	0010		DC2	"	2	B	R	b	r		DC2	ó	▓	┬	╥	Γ	≥
		2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
3	0011		DC3	#	3	C	S	c	s		DC3	ú	│	├	╙	Π	≤
		3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
4	0100		DC4	$	4	D	T	d	t		DC4	ñ	┤	─	╘	Σ	⌠
		4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
5	0101			%	5	E	U	e	u			Ñ	╡	┼	╒	σ	⌡
		5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	0110			&	6	F	V	f	v			ª	╢	╞	╓	µ	÷
		6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	0111			'	7	G	W	g	w			º	╖	╟	╫	τ	≈
		7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	1000	BS	CAN	(	8	H	X	h	x	BS	CAN	¿	╕	╚	╪	Φ	°
		8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
9	1001	HT		)	9	I	Y	i	y	HT		⌐	╣	╔	┘	Θ	■
		9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
A	1010	LF		*	:	J	Z	j	z	LF		¬	║	╩	┌	Ω	–
		10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
B	1011	VT	ESC	+	;	K	[	k	{	VT	ESC	½	╗	╦	■	δ	√
		11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
C	1100	FF		,	<	L	\	l	¦	FF		¼	╝	╠	▬	∞	ⁿ
		12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
D	1101	CR	GS	–	=	M	]	m	}	CR	GS	¡	╜	═	▌	Ø	²
		13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
E	1110	SO		.	>	N	^	n	~	SO		«	╛	╬	▐	ε	■
		14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
F	1111	SI		/	?	O	_	o		SI		»	┐	╧	▀	∩	SP
		15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

Graphic Elements

Note: When U.S.A. font is selected.

Graphic Elements

IBM CHARACTER SET 2 (IN IBM MODE)

Upper Bit / Lower Bit	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex.	Binary	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
1	0001		DC1	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	β	±
		1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
2	0010		DC2	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
		2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
3	0011	♥	DC3	#	3	C	S	c	s	â	ô	ú	│	├	╙	Π	≤
		3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
4	0100	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
		4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
5	0101	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
		5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	0110	♠		&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
		6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	0111			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
		7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	1000	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
		8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
9	1001	HT		)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	θ	■
		9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
A	1010	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	−
		10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
B	1011	VT	ESC	+	;	K	[	k	{	ï	Ç	½	╗	╦	■	δ	√
		11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
C	1100	FF		,	<	L	\	l	|	î	£	¼	╝	╠	▬	∞	ⁿ
		12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
D	1101	CR	GS	−	=	M	]	m	}	ì	¥	¡	╜	═	▌	Ø	²
		13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
E	1110	SO		.	>	N	^	n	~	Ä	Pt	«	╛	╬	▐	ε	■
		14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
F	1111	SI		/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	SP
		15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

Graphic Elements

Graphic Elements

Note: When U.S.A. font is selected.

APPENDIX F CONTROL CODE SUMMARY

○: Valid ×: Invalid

CATEGORY	ITEM	SYMBOL	DECIMAL (HEX)	FUNCTION	STANDARD MODE	IBM MODE	PAGE
PRINT COMMANDS	1	CR	13 (0D)	Carriage return or carriage return plus linefeed after printing	○	○	43
	2	LF	10 (0A)	Linefeed plus carriage return after printing	○	○	44
	3	FF	12 (0C)	Form feed after printing	○	○	45
	4	VT	11 (0B)	Linefeed to next vertical tab after printing	○	○	46
	5	ESC, J, n	27, 74, n (1B, 4A, n)	n/144" or n/216" linefeed after printing	○	○	47
	6	ESC, j, n	27, 106, n (1B, 6A, n)	n/144" or n/216" reverse linefeed after printing	○	○	48
CHARACTER MODE DESIGNATIONS	7	ESC, P	27, 80 (1B, 50)	Termination of Elie	○	○	50
	8	ESC, M	27, 77 (1B, 4D)	Elite (12 CPI)	○	○	50
	9	SI	15 (0F)	Condensed	○	○	51
	10	ESC, SI	27, 15 (1B, 0F)	Ditto	○	○	51
	11	DC2	18 (12)	Termination of condensed	○	○	51
	12	ESC, x, 1	27, 120, 49 (1B, 78, 31)	Near Letter Quality (NLQ)	○	○	52
	13	ESC, x, 0	27, 120, 48 (1B, 78, 30)	Termination of NLQ	○	○	52
	14	ESC, p, 1	27, 112, 49 (1B, 70, 31)	Proportional	○	○	53
	15	ESC, p, 0	27, 12, 48 (1B, 70, 30)	Termination of proportional	○	○	53
	16	ESC, S, 0	27, 83, 48 (1B, 53, 30)	Superscript	○	○	54
	17	ESC, S, 1	27, 83, 49 (1B, 53, 31)	Subscript	○	○	54
	18	ESC, T	27, 84 (1B, 54)	Termination of superscript/ subscript	○	○	54
	19	ESC, 4	27, 52 (1B, 34)	Italic	○	×	55
	20	ESC, 5	27, 53 (1B, 35)	Termination of italic	○	×	55
	21	ESC, !, n	27, 33, n (1B, 21, n)	Multiple print modes designation	○	○	56
EMPHASIZED CHARACTER	22	ESC, E	27, 69 (1B, 45)	Empahsized (bold)	○	○	57
	23	ESC, F	27, 70 (1B, 46)	Termiantion of emphasized	○	○	57
DOUBLE-STRIKE CHARACTER	24	ESC, G	27, 71 (1B, 47)	Double-strike	○	○	58
	25	ESC, H	27, 72 (1B, 48)	Termination of double-strike	○	○	58
DOUBLE-WIDTH CHARACTER	26	SO	0E (14)	Double-width mode valid for only the present line	○	○	59
	27	ESC, SO	27, 14 (1B, 0E)	Ditto	○	○	59
	28	DC4	20 (14)	Termination of SO command	○	○	59
	29	ESC, W, 1	27, 87, 49 (1B, 57, 31)	Double-width mode valid until terminated	○	○	60
	30	ESC, W, 0	27, 87, 40 (1B, 57, 30)	Termination of ESC.W.1 command	○	○	60

○: Valid ×: Invalid

CATEGORY	ITEM	SYMBOL	DECIMAL (HEX)	FUNCTION	STANDARD MODE	IBM MODE	PAGE
GRAPHIC MODE	31	ESC, K, n1, n2	27, 75, n1, n2 (1B, 4B, n1, n2)	Standard-density graphic mode	○	○	60
	32	ESC, L, n1, n2	27, 76, n1, n2 (1B, 4C, n1, n2)	Double-density graphic mode	○	○	62
	33	ESC, Y, n1, n2	27, 89, n1, n2 (1B, 59, n1, n2)	Double-speed double-density graphic mode	○	○	63
	34	ESC, Z, n1, n2	27, 90, n1, n2 (1B, 5A, n1, n2)	Quadruple-density graphic mode	○	○	64
	35	ESC, *, m, n1, n2	27, 42, m, n1, n2 (1B, 2A, m, n1, n2)	Various graphic modes designation	○	○	65
	36	ESC, ^, a, n1, n2	27, 94, a, n1, n2 (1B, 5E, a, n1, n2)	9-pin graphic designation	○	○	66
	37	ESC, ?, n, m	27, 63, n, m (1B, 3F, n, m)	Re-assign 8-bit graphic modes	○	○	67
LINEFEED PITCH	38	ESC, 0	27, 48 (1B, 30)	Set linefeed pitch to 1/8″	○	○	68
	39	ESC, 1	27, 49 (1B, 31)	Set linefeed pitch to 7/72″	○	○	68
	40	ESC, 2	27, 50 (1B, 32)	Set linefeed pitch to 1/6″	○	–	69
				Perform ESC, A command	–	○	69
	41	ESC, 3, n	27, 51, n (1B, 33, n)	Set linefeed pitch to n/216″ or n/144″	○	○	70
	42	ESC, A, n	27, 65, n (1B, 41, n)	Set linefeed pitch to n/72″	○	–	71
				Set linefeed pitch of n/72″ that will become valid by ESC, 2 command.	–	○	71
	43	GS (01)	29, 1 (1D, 01)	Designate linefeed pitch of n/144″ for ESC 3 n , ESC J n , and ESC j n commands	○	○	72
	44	GS (00)	29, 0 (1D, 00)	Designate linefeed pitch of n/216″ for ESC 3 n , ESC J n , and ESC j n commands	○	○	72
PAGE LENGTH	45	ESC, C, n	27, 67, n (1B, 43, n)	Line unit page length setting	○	○	73
	46	ESC, C, (00), n	27, 67, 0, n (1B, 43, 00, n)	Inch unit page length setting	○	○	74
HORIZONTAL TAB	47	ESC, D, ..., NUL	27, 68, ..., 0 (1B, 44, ..., 00)	Horizontal tab position setting	○	○	75
	48	HT	9 (09)	Move to next horizontal tab	○	○	76
MARGIN SETTING TAB	49	ESC, Q, n	27, 81, n (1B, 51, n)	Right margin setting	○	○	76
	50	ESC, l, n	27, 108, n (1B, 6C, n)	Left margin setting	○	○	77
	51	ESC, X, n1, n2	27, 88, n1, n2 (1B, 58, n1, n2)	Left and right margins setting	○	○	78
UNDER-LINING	52	ESC, –, 1	27, 45, 49 (1B, 2D, 31)	Underline setting	○	○	79
	53	ESC, –, 0	27, 45, 48 (1B, 2D, 30)	Underline termination	○	○	79
BUFFER	54	CAN	24 (18)	Clear internal buffer	○	○	

○: Valid ×: Invalid

CAEGORYy	ITEM	SYMBOL	DECIMAL (HEX)	FUNCTION	STANDARD MODE	IBM MODE	PAGE
BACK SPACE	55	BS	8 (08)	After printing, move 1 character position to the left.	○	○	80
HOME POSITIONING	56	ESC, <	27, 60 (1B, 3C)	Move print head to home position	○	○	80
SIKP-OVER PERFORATION	57	ESC, N, n	27, 78, n (1B, 4E, n)	Skip over n bottom line of the page	○	○	81
	58	ESC, O	27, 79 (1B, 4F)	Termination of skip-over perforation	○	○	81
RESET	59	ESC, @	27, 64 (1B, 40)	Initialize printer	○	○	82
PRINTING DIRECTION	60	ESC, U, 1	27, 85, 49 (1B, 55, 31)	Unidirectional printing designation	○	○	83
	61	ESC, U, 0	27, 85, 48 (1B, 55, 30)	Bidirectional printing designation	○	○	83
INTER-NATIONAL CHARACTERS	62	ESC, R, n	27, 82, n (1B, 52, n)	Select international character	○	–	84
TAB INITIALI-ZATION	63	ESC, R	27, 82 (1B, 52)	Restore default tab settings	–	○	86
DELETING DATA	64	DEL	127 (7F) 255 (FF)	Delete one character	○	×	86
VERTICAL TAB	65	ESC, B	27, 66 (1B, 42)	Vertical tab setting	○	○	86
	66	ESC, b	27, 98 (1B, 62)	Vertical tab setting in channels	○	×	87
	67	ESC, /, m	27, 47, m (1B, 2F, m)	Select channel of vertical tab	○	×	87
PRINTER SELECTION	68	DC3	19 (13)	De-select printer	○	○	89
	69	DC1	17 (11)	Select printer	○	○	89
DOWNLOAD CHARACTERS	70	ESC, %, 00, 00	27, 37, 0, 0 (1B, 25, 00, 00)	Select normal character set stored in ROM	○ Only draft character	×	90
	71	ESC, %, 01, 00	27, 37, 1, 0 (1B, 25, 01, 00)	Switch to download character set stored in RAM			90
	72	ESC, :, 00, 00, 00	27, 58, 0, 0, 0 (1B, 3A, 00, 00, 00)	Copy RAM download character set from ROM character set			90
	73	ESC, &, ...	27, 38 (1B, 26)	Define download characters			90
INPUT DATA CONTROL	74	ESC, =	27, 61 (1B, 3D)	8th bit (MSB) of data is '0'	○	×	97
	75	ESC, >	27, 62 (1B, 3E)	MSB of data is '1'	○	×	98
	76	ESC, #	27, 35 (1B, 23)	Recognize 8 bits of data	○	×	98

○: Valid ×: Invalid

CATEGORY	ITEM	SYMBOL	DECIMAL (HEX)	FUNCTION	STANDARD MODE	IBM MODE	PAGE
PRINT CODE AREA DESIGNATION	77	ESC, 6	27, 54 (1B, 36)	Enlarge print codes area	○	–	99
				IBM character set 2 designation	–	○	100
	78	ESC, 7	27, 55 (1B, 37)	Clear ESC, 6 command	○	–	101
				IBM character set 1 designation	–	○	101
	79	ESC, I, 1	27, 73, 49 (1B, 49, 31)	Define print characters in control code area	○	×	101
	80	ESC, I, 0	27, 73, 48 (1B, 49, 30)	Clear ESC, I, 1 command	○	×	102
IMMEDIATE PRINTING	81	ESC, i, 1	27, 105, 49 (1B, 69, 31)	Immediate printing without a print command	○	○	103
	82	ESC, i, 0	27, 105, 48 (1B, 69, 30)	Clear ESC, i, 1 command	○	○	103
CR CODE CONTROL	83	ESC, 5, 1	27, 53, 49 (1B, 35, 31)	CR command = CR + LF	×	○	104
	84	ESC, 5, 0	27, 53, 48 (1B, 35, 30)	CR command = CR only	×	○	104
PRINT POSITION CONTROL	85	ESC, SP, n	27, 32, n (1B, 20, n)	Set intercharacter space in dot units	○	○	105
	86	ESC, $, n_1, n_2	27, 36, n_1, n_2 (1B, 24, n_1, n_2)	Set absolute dot position	○	○	106
	87	ESC, \, n_1, n_2	27, 92, n_1, n_2 (1B, 5C, n_1, n_2)	Set relative dot position	○	○	106

SEIKOSHA CO.,LTD.

SYSTEM EQUIPMENT DIVISION

4-1-1 TAIHEI SUMIDA-KU TOKYO 130, JAPAN